CLARK FORK SUPERFUND SITES

MASTER PLAN

DRAFT

U.S. Environmental Protection Agency

and

Montana Department of
Health and Environmental Sciences

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TABLE OF CONTENTS

PREFACE

This document is the second edition of the Clark Fork ***Superfund***[1] Sites Master Plan and is a product of the Master Plan Work Group. The work group consists of representatives of the U.S. Environmental Protection Agency (EPA); the Montana Department of Health and Environmental Sciences (MDHES); the affected local communities; and the Atlantic Richfield Company ARCO), the major ***potentially responsible party (PRP)*** at the Clark Fork Superfund sites. The work group prepared this plan to describe the overall approach being used to address environmental contamination problems at four Superfund sites in the Clark Fork River basin (Clark Fork basin), located in southwestern Montana.

The four "Clark Fork sites" are Silver Bow Creek/Butte Area, Anaconda Smelter, Milltown Reservoir, and Montana Pole. The sites encompass areas in and around Butte, Rocker, Anaconda, and Milltown, and include Silver Bow Creek and the Clark Fork River (Clark Fork) from Butte downstream to Missoula (see maps on pages 2, 10, 13, and 16). The Clark Fork basin includes the upper reaches of the Clark Fork and its tributaries, including Silver Bow, Mill, Willow, Rock, and Flint creeks, along with other minor tributaries. EPA and MDHES ("the agencies") are coordinating efforts to address site-related problems by maintaining regular communication among involved parties.

Information contained in this plan comes from detailed technical and community involvement documents prepared or approved by EPA and MDHES to guide scientific studies, community participation efforts, and cleanup activities. These documents are available for public review in information files located in communities throughout the Clark Fork basin (see Appendix A for locations and business hours).

EPA and MDHES, in conjunction with the Master Plan Work Group, published the first edition of the Master Plan in October 1988. That document described how study and cleanup activities at the sites would be conducted in a coordinated and integrated manner, with full consideration given to the potential effects that release of contaminants from upstream sources may have on downstream areas.

1. Words that are ***bold-faced and italicized*** on their first appearance are defined in the glossary beginning on page 36.

Since 1988, EPA, MDHES, and the potentially responsible parties have made substantial progress in addressing problems at the sites. This edition of the Master Plan outlines future cleanup plans and describes progress made thus far in investigating the sites and addressing contamination problems.

1.0 INTRODUCTION

The goal of this Master Plan is to describe a rational basis for addressing the many operable units at the Clark Fork sites. This includes defining the operable units and their interrelationships and the order in which to address them. The results will be used to track Superfund activities through the next several years and coordinate these activities among the four separate Clark Fork sites.

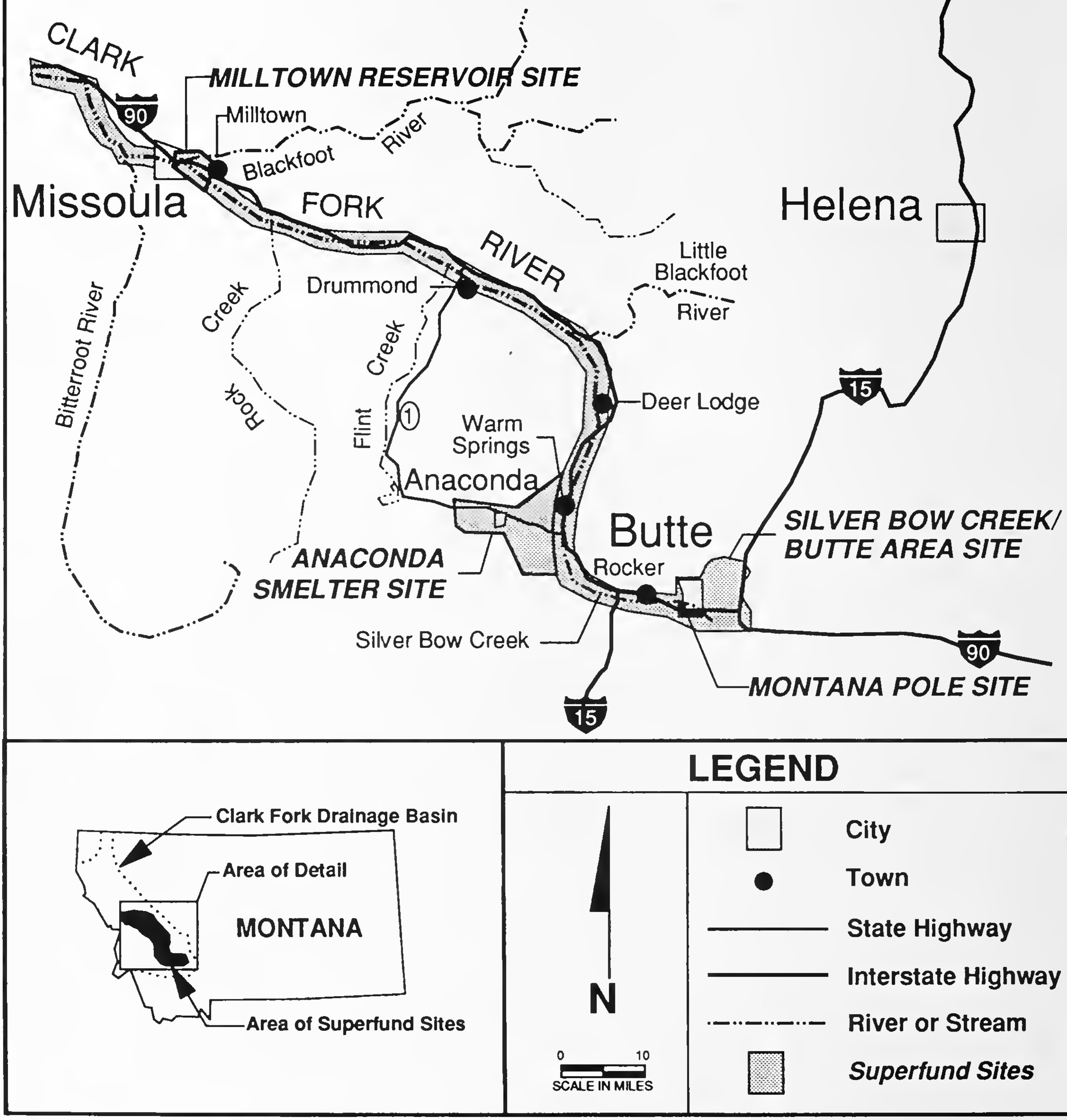
Some of the specific objectives EPA and MDHES have identified for the master planning effort are to:

- Prioritize and coordinate inter-site activities to achieve the most rapid and effective investigation and cleanup as possible;
- Coordinate Superfund activities with other investigations and environmental improvement programs being conducted in the basin. (See *Clark Fork Basin Project Status Report Action Plan,* Office of the Governor, December 1988);
- Provide consistent approaches to response actions at all the sites; and
- Communicate information on Superfund activities to all interested parties.

The Clark Fork basin is an integrated ecosystem, and the well-being of downstream humans, plants, and animals depends in part on the quality of the upstream environment. EPA and MDHES are committed to approaching the basin as a whole in coordinating Superfund efforts because activities at one site will affect activities at other sites.

To achieve coordination among the sites, EPA and MDHES closely abide by federal and state laws that guide Superfund response actions, primarily the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended. In

Location of Superfund Sites in the Clark Fork Basin



addition, EPA has developed nationwide standards of quality and guidance for work conducted at Superfund sites. The standards and guidance ensure that studies are comprehensive, that final remedies are scientifically sound and achieve appropriate levels of human health and environmental protection, and that site-related technical and legal issues are addressed fully.

1.1 Master Plan Organization

The Master Plan was organized to give readers an understanding of the Superfund process and their part in it and to explain the master planning effort and progress made to date.

Section 1 is an introduction to the Master Plan. It describes the goals and specific objectives identified for the master planning effort and provides an overview of the plan.

Section 2 describes the Superfund site investigation and cleanup process and the legal tools EPA has available to encourage the participation of the potentially responsible parties in remedial activities. This section describes the federal laws and policies authorizing and governing Superfund ***response actions.***

Section 3 reflects the emphasis on community involvement that derives from the Superfund management study commissioned by EPA Administrator William K. Reilly. The prominence of this section indicates the important role that Montana residents are playing in decisions concerning the sites. It outlines the opportunities for public comment on study and cleanup plans and provides contacts for further information.

Section 4 details the Clark Fork Superfund master planning effort and the assumptions and goals that went into it. This section describes the planning process and indicates cleanup levels that guide agency efforts.

Section 5 outlines the process used in examining issues and setting priorities among the operable units (please see Table 1, page 18). It includes sequencing issues and the schedules for response activities to be conducted in the future. This section is supplemented by detailed master schedules.

Appendix A is a list of the information repositories detailing the locations and business hours of the places where the draft Clark Fork Master Plan can be reviewed by the public.

Appendix B describes each site and discusses how each came to be included on the ***National Priorities List (NPL)***, EPA's roster of hazardous waste sites that are eligible for federal funding for investigation and cleanup. It also describes studies that have been completed or are underway relative to the Clark Fork sites and summarizes specific steps EPA and MDHES have taken to protect human health and the environment.

The Master Plan Work Group prepared this edition of the Master Plan to help interested parties better understand past, present, and future Superfund efforts in the Clark Fork basin. The work group remains open to public comment on how to improve the content and presentation of the information contained within the Master Plan.

2.0 THE SUPERFUND PROCESS: A STRUCTURE FOR CLEANUP

When Congress created the Superfund program in 1980, it gave EPA broad authority to investigate and clean up hazardous waste sites that actually or potentially threaten human health and the environment. In passing the law, Congress also directed EPA to establish specific policies and procedures to be followed in conducting all Superfund activities. The policies and procedures EPA adopted are contained in the National Oil and Hazardous Substances Pollution Contingency Plan, known as the National Contingency Plan. These policies are comprehensive and very detailed, because they are intended to provide a complete framework for Superfund responses to the full spectrum of hazardous waste problems throughout the country. The Superfund laws and policies provide EPA and MDHES with a number of mechanisms to address specific needs of sites in the Clark Fork basin. Agencies use these mechanisms to tailor their responses to the unique circumstances of each site.

Presented in the paragraphs that follow are brief descriptions of the procedures EPA generally follows in conducting Superfund response activities. It should be noted that the potentially responsible parties may conduct many of the activities below with EPA or MDHES oversight.

2.1 Conduct Preliminary Assessment/Site Investigation

After a potential hazardous waste site is discovered or reported, EPA or MDHES conducts a preliminary assessment and site investigation. These activities involve reviewing existing information and collecting new data. This information is used to assess whether the site is eligible to be included on the National Priorities List. EPA places sites on the National Priorities List

when it determines that contamination at the site may actually or potentially threaten human health or the environment, as reflected by its Hazard Ranking Score, a set of ranking criteria.

2.2 Activate Superfund Enforcement Authorities

After a site is placed on the National Priorities List, EPA conducts a search to identify all the individuals, companies, or organizations that may be responsible for the contamination. Superfund gives EPA and MDHES authority to compel these so-called "potentially responsible parties" to pay for studies, cleanups, and other site-related response activities. The search may last throughout the time it takes to complete the ***remedial investigation and feasibility study (RI/FS)***. Once the potentially responsible parties are identified, EPA negotiates with them to conduct or pay for the necessary studies and remedial activities. Each legally binding agreement between EPA and the potentially responsible parties is formalized in an ***administrative order on consent.*** If the potentially responsible parties refuse to participate in remedial activities, EPA may require their participation by issuing a ***unilateral order*** (a court order). If EPA must perform the work, EPA may collect up to three times the cost of the studies and cleanup by bringing a civil action against the potentially responsible parties in a court of law.

In cases where the potentially responsible parties cannot be identified, or in the event they are unable to pay, EPA may use money from the Hazardous Substances Trust Fund (from which "Superfund" gets its name) to finance studies and response actions. EPA also may use money from the "Superfund" to conduct response activities while the potentially responsible parties are being identified and negotiations are underway. EPA will then use its authority to recover costs for any response activities it conducts at a site.

2.3 Perform Removal Actions, if Necessary

Removal actions are cleanup actions conducted in the short-term. They are designed and implemented to be consistent with the projected final remedial action. Removal actions do not necessarily involve the "removal" of hazardous substances, but rather the "removal" of threats to human health and/or the environment. There are three types of removals:

- ***Emergency response*** is completed within a matter of hours or days to a threat of major significance, such as a chemical spill;

- ***Time-critical response*** is completed within a reasonably short time period from discovery of the threat; and

- ***Expedited response action (ERA),*** also referred to as a ***non-time-critical response***, is completed before a remedial investigation and feasibility study but after an ***engineering evaluation and cost analysis (EE/CA)*** is prepared to guide removal efforts.

EPA may initiate a removal action at any time in the Superfund process. If six months time is available prior to implementing a removal action, EPA must conduct an engineering evaluation and cost analysis to gather the specific information needed to select and design the removal action and to analyze various methods for controlling the problem. At the Clark Fork sites, EPA and MDHES have conducted or plan to conduct a number of removal actions (please see Table 2, page 19). Decisions on removal actions are documented in an ***action memorandum.***

2.4 Prepare Work Plan and Conduct Remedial Investigation and Feasibility Study

After a site is placed on the National Priorities List, EPA prepares a work plan and conducts a remedial investigation and feasibility study. The work plan describes specific activities to be conducted during the remedial investigation and feasibility study. The objective of a remedial investigation (RI) is to describe fully the types, quantities, and locations of contamination at a site and to assess the effects this contamination may have on human health and the environment. The potential effects are documented in a ***risk assessment***. Information collected during a remedial investigation at a site is used to identify and screen potential cleanup alternatives. Full development and detailed analysis of cleanup alternatives are conducted during the feasibility study (FS), which often overlaps with the remedial investigation.

2.5 Select Cleanup Alternative

After the remedial investigation and feasibility study are completed, EPA prepares a ***proposed plan*** describing the cleanup alternatives developed and evaluated in the feasibility study and indicates the preferred alternative. EPA then holds a minimum 30-day public comment period on the proposed plan.

The various alternatives developed during the feasibility study are evaluated against the following nine criteria:

1. Overall protection of human health and the environment;

2. Compliance with federal and state environmental protection laws and standards, usually referred to as applicable or relevant and appropriate requirements (ARARs);

3. Cost;

4. Short-term effectiveness;

5. Long-term effectiveness;

6. Reduction of contaminant toxicity, mobility, and volume;

7. Technical and administrative feasibility;

8. State acceptance; and

9. Community acceptance.

When the comment period ends and EPA has considered the public comments, the EPA Regional Administrator signs a ***record of decision (ROD)*** and thus selects the ***remedial action***. A remedial action is a series of steps taken to eliminate, control, or monitor the actual or potential release of contaminants from a Superfund site to the environment.

2.6 Prepare Remedial Design and Implement Remedial Action

After a remedial action is selected, EPA prepares the ***remedial design***, which usually consists of detailed plans, engineering drawings, and specifications that will be used to implement the remedial action. When the remedial design is finalized, cleanup can begin.

EPA and MDHES will continue to be involved with the Clark Fork sites in the years after cleanup. When hazardous wastes are left on site, EPA must review cleanup five years after completion to be sure that removal and remedial actions adequately addressed threats to human health and the environment.

The time needed to complete investigation and cleanup activities is different for every site. Generally, a remedial investigation and feasibility study may last from 18 to 30 months. A remedial action may take from six months to a year to design and one to two years to implement. During this three-year-plus period, EPA also may conduct engineering evaluations and cost analyses in order to implement removal actions. These normally take six months to one year to complete.

3.0 COMMUNITY INVOLVEMENT: THE KEY TO SATISFACTORY DECISIONS

Public participation is an increasingly important part of the Superfund activities being conducted at the four Clark Fork sites. EPA has committed resources of staff and funding to foster involvement at the sites. A community involvement coordinator joined the staff in January 1990 and leads state-wide EPA efforts from Helena. Locally-hired community relations liaisons are located in both Butte and Anaconda. MDHES's Superfund Public Information Officer continues to work to involve the public, especially at the state-lead Montana Pole site.

Early in the Superfund process, EPA and MDHES prepared community relations plans for each of the four Clark Fork sites to summarize initial community concerns and outline a program for conducting community involvement activities. The agencies have since greatly expanded the community involvement program. The program now provides for public participation in defining the scope of studies; preparing reports that describe study results; and identifying, evaluating, and selecting removal and remedial actions. The program also enables the public to monitor legal settlements with the potentially responsible parties and participate in developing remedial design plans. At the Milltown Reservoir site, community representatives are participating in the development of the risk assessment.

3.1 90-Day Study Recommendations

During confirmation hearings for EPA Administrator William K. Reilly, the Senate expressed the desire to see an evaluation of the Superfund program and how it could be improved. Reilly promised to return with a management review within 90 days. The result was "A Management Review of the Superfund Program," known internally as the 90-day study. In the study, EPA announced a new long-term strategy for the Superfund program. One element of the strategy is to encourage full participation by communities in cleanup decisions. The authors of the 90-day study made 50 recommendations for improving the Superfund program. Of the 50 recommendations, 10 deal with community involvement. Those recommendations are:

1. Give citizens a much greater role in the Superfund program, especially at potentially responsible party-lead sites;

2. Strongly support increased citizen involvement in Superfund decisions and accept occasional delays as a result of greater public involvement;

3. Plan for citizen involvement at each stage of the Superfund process;

4. Increase EPA staff to allow more frequent communication with the affected public;

5. Use "Senior Environmental Employees" (retirees) more extensively in Superfund;

6. Ensure that citizens' access to information is comparable to that of the potentially responsible parties;

7. Release information to the ***administrative record*** and to information repositories as quickly as possible and ensure that citizens are notified of the availability of this information;

8. Write clear, understandable summaries of complex technical documents and provide copies to citizens;

9. Encourage EPA regions to find ways to bring citizens into technical discussions early in the process; and

10. Strongly support the reform of the Technical Assistance Grants program to eliminate barriers to their use (see page 7 for an explanation of Technical Assistance Grants).

EPA's 90-day study emphasizes an aggressive program of community involvement, places high value on full and deliberate public discussion, and accepts the consequence of an occasional missed deadline as the cost. The agency has been developing guidance to implement the above recommendations and is updating older guidance to reflect them. The 90-day study is having a direct effect on the activities at the Clark Fork sites.

The overall goal of the community involvement program is to encourage public participation early in the process and to make sure community interests and concerns are fully understood, considered, and, whenever possible, implemented, when EPA and MDHES make site-related decisions. Some elements of the community involvement program for the Clark Fork sites are described below.

3.2 Community Involvement During Removal Actions

Removal actions proceed on an accelerated schedule, and, therefore, there is limited time for extensive community involvement activities. Nevertheless, EPA and MDHES are committed to active community involvement to the fullest extent possible. During removal actions, EPA may encourage residents to:

- Participate in defining the scope of proposed removal actions;
- Review and comment on draft engineering evaluation and cost analysis work plans;
- Review and comment on draft engineering evaluation and cost analysis reports; and
- Review and comment on final negotiated orders for the potentially responsible parties to implement removal actions.

3.3 Community Involvement During Remedial Activities

During remedial activities, including the remedial investigation and feasibility study, remedial design and remedial action, EPA and MDHES encourage full public participation in the broad spectrum of decisions to be made throughout the process. The agencies encourage residents and other interested parties to:

- Participate in defining the scope of proposed remedial actions;
- Review and comment on draft remedial investigation and feasibility study work plans and, where appropriate, on draft administrative orders on consent and unilateral orders directing the potentially responsible parties to conduct remedial studies;
- Ask for information reports on negotiations with the potentially responsible parties;
- Review and comment on draft documents prepared during the remedial investigations and feasibility studies;
- Attend public meetings during remedial investigations and feasibility studies to discuss interim results and refine remedial objectives;
- Review and comment on draft remedial investigation and feasibility study reports and proposed plans;
- Read responsiveness summaries that provide EPA's and MDHES's responses to comments received on proposed plans;
- Attend public meetings to discuss remedial design considerations for the selected remedy;

- Review revised community relations plans for each of the sites; and
- Review and comment on the final consent decrees directing the potentially responsible parties to implement the selected remedial actions.

EPA and MDHES will be conducting a number of other activities to keep community members informed about site-related developments. These may include preparing information sheets and news releases, and holding public meetings to bring residents up to date on study and cleanup efforts. The agencies will announce public meetings in local newspapers and distribute information sheets to individuals whose names are on EPA's and MDHES's mailing lists. Residents wishing to be added to the mailing lists are encouraged to write to EPA and ask to be placed on this list (address listed below).

Full documents may be reviewed in the information files located throughout the Clark Fork basin. See Appendix A for locations and hours of offices where these files are housed. Anyone wishing to review the administrative record, which contains all documents related to a Superfund decision, may do so at EPA's or MDHES's offices in Helena, or at selected locations near the sites. The public is encouraged to contact EPA's or MDHES's staff about the locations of administrative records for individual operable units. The following EPA and MDHES staff can be contacted by mail or telephone:

Bob Fox
Clark Fork Coordinator
U.S. Environmental Protection Agency
Room 285, Federal Building
301 South Park
Helena, Montana 59626
(406) 449-5414

Pam Hillery
Community Involvement Coordinator
U.S. Environmental Protection Agency
Room 285, Federal Building
301 South Park
Helena, Montana 59626
(406) 449-5414

Janie Stiles
Public Information Officer
Montana Department of Health and Environmental Sciences
Cogswell Building
Helena, Montana 59620
1-800-648-8465 (in-state toll-free number)
or (406) 444-1420

EPA and MDHES keep in regular contact with a number of community groups that monitor Superfund activities taking place in the basin. Some of these groups include the Clark Fork Coalition, the Milltown EPA Superfund Site group, the Citizens' Technical Environmental Committee, the Anaconda-Deer Lodge Reclamation Advocates, and the Opportunity Concerned Citizens. These groups have different priorities when considering Superfund activities in the Clark Fork basin. Some are concerned primarily with environmental protection, some with technical accuracy and integrity, and others are working for economic recovery in communities affected by hazardous wastes. If you are interested in being involved with these groups, some contacts are listed below:

Clark Fork Coalition
Peter Nielsen, Executive Director
Phil Tourangeau, Staff Scientist
P.O. Box 7539
Missoula, Montana 59807
(406) 542-0539

Citizens' Technical Environmental Committee
Floyd Bossard, Co-Chair
Bill MacGregor, Co-Chair
Larry Twidwell, Co-Chair
P.O. Box 3928
Butte, Montana 59701
(406) 494-2280

Anaconda-Deer Lodge Reclamation Advocates
Chuck Haeffner, 218 Evergreen
Frank Bennett, 2100 Garfield
Anaconda, Montana 59711
(406) 563-5203

Milltown EPA Superfund Site Group
Tina Reinicke-Schmaus
P.O. Box 7539
Missoula, Montana 59807
(406) 258-6244

3.4 Technical Assistance Grants

In order to enhance community understanding of Superfund data, reports, and recommendations, the Superfund Amendments and Reauthorization Act (SARA) of 1986 authorized a new program called Technical Assistance Grants (TAG). The grants provide funds for qualified citizens' groups to hire independent technical advisors to help community members understand and comment on technical documents and cleanup recommendations. The 90-day study encouraged EPA to eliminate barriers to communities wishing to obtain and use Technical Assistance Grants.

EPA can award only one Technical Assistance Grant per site, and this award can equal up to $50,000. EPA may grant requests for a waiver or renewal of a Technical Assistance Grant, potentially raising the funding limit to $100,000. Citizens' groups that receive grants must contribute an additional 20 percent of the total award by providing either funds or in-kind services.

EPA will accept applications from community groups that may be affected by one or more of the four Clark Fork Superfund sites. The Technical Assistance Grant application process is initiated when EPA receives a letter of intent from a citizens' group indicating the group's plans to seek a grant. For more information on this program, please contact John Ogden at 1-800-424-9346 (EPA Region VIII headquarters).

Thus far, one Technical Assistance Grant has been awarded in Montana. The Flathead Lake Protection Association administers the grant for the Somers Tie Treating Plant Superfund site in Somers. The agencies have learned that informed community involvement at an early stage in the Superfund process helps produce cleanup remedies that are more acceptable to all involved parties.

4.0 THE CLARK FORK MASTER PLANNING EFFORT: A FRAMEWORK FOR COORDINATED ACTION

The Master Plan Work Group initiated the Clark Fork master planning effort after the complex interrelationships among the four Superfund sites became apparent. At that point (late 1987), many remedial and removal activities were already planned or underway. Thus, one of the first tasks of the work group, after it was established, was to account for certain activities. The following activities were deemed basic to the Clark Fork master planning effort:

- **Recognize ongoing activities.** The work group's primary hurdle is to integrate ongoing activities into the overall effort, rather than trying to redirect or redo what has been initiated previously.

- **Define broad cleanup goals for the basin-wide Superfund effort.** There is no single cleanup standard that applies throughout the country for any given contaminant. Many variables affect these standards, including the chemical form of the contaminant, proximity to population centers, and climatic conditions. The master planning effort assures that cleanup standards are applied consistently throughout the four Clark Fork sites. The standards may vary, but the logic for the variances is similar across all sites.

- **Describe major human health and environmental impacts at the sites.** Residents asked EPA and MDHES to provide a comprehensive picture of the potential impacts of contamination throughout the Clark Fork basin. The Master Plan will catalogue environmental problems throughout the Clark Fork basin.

- **Describe proposed response actions in a comprehensive approach to the Clark Fork basin.** Just as people have asked about the basin-wide impacts, they have also wanted to know how EPA and MDHES plan to address the contamination problems throughout the Clark Fork basin. The master planning effort is a vehicle for comprehensive discussion of response actions.

- **Develop an extensive master schedule that details projects, activities, and interrelationships.** The master planning process helps assure that limited resources are applied to the most pressing problems first. The Master Schedule is a calendar of planned and anticipated activities. It is dynamic, however, and can be altered as issues and plans change.

4.1 Premises for Action

EPA and MDHES intend to move through the study and cleanup process as quickly and efficiently as possible, while protecting human health and the environment. As background to the master planning effort, this section presents the agencies' intentions.

- **Records of decision will be developed for individual operable units over time.** A range of factors, including potential threats to human health and the environment, complexity of problems, and impacts on other operable units will affect how quickly cleanup on some operable units will proceed. If work on an individual operable unit is completed, EPA will proceed with a separate record of decision for that unit.

- **In some instances, records of decision and legal documents may encompass multiple operable units.** Whenever work and decisions on operable units can be coordinated with one other, records of decision and other legal documents will be combined in order to save time and effort.

- **Expedited response actions may occur at various locations.** The master planning effort provides for serious contamination problems to be addressed first, then integrates these interim responses into the overall site effort.

- **Operable units may be redefined or reordered.** The Master Plan allows a broad perspective on the Clark Fork sites, and, where necessary, provides for changes in site organization.

4.2 Consistency in Cleanup Goals

The protection of human health and the environment at the Clark Fork sites involves contaminants in air, surface water, ***ground water***, sediments, and soils. Each operable unit has one or more contaminant source and ***pathway***. Additionally, each operable unit affects, or has the potential to affect, human or wildlife populations. To the extent these sources, pathways, and populations are interconnected, the operable units should be addressed in a coordinated manner.

EPA and MDHES have proposed six broad, general cleanup goals for protection of both human populations and the environment. These are:

1. Remedies should provide reliable, effective protection over the long-term;

2. Treatment of principal threats is strongly preferred, wherever practicable;

3. Appropriate remedies may combine treatment and ***containment***;

4. Ground waters will be returned to beneficial uses, whenever practicable;

5. Containment may be most appropriate for wastes that pose a relatively low long-term threat or where treatment is impractical; and

6. ***Institutional controls*** through local governments may be used as a supplement to ***engineering controls*** in some cases.

In addition, the agencies will identify and comply with site-specific detailed applicable or relevant and appropriate requirements and other cleanup standards. Some of the many applicable or relevant and appropriate requirements are:

The federal Clean Air Act;
The federal Endangered Species Act; and
The Montana Water Quality Act.

Standards more specific than applicable or relevant and appropriate requirements may be applied in selecting remedies at the Clark Fork site. These standards require recognition and reduction of risks that humans will contract cancer in excess of 1 in 10,000 to 1 in 1,000,000 from all contaminants for all pathways. In other words, if the contaminants increase the chance of humans getting cancer by 1 in 10,000 to 1 in 1,000,000, EPA and MDHES will require the potentially responsible parties to reduce that risk.

Further, EPA has established a body of specific criteria for every potential contaminant that may affect drinking water, air quality, and aquatic organisms. These standards and criteria will be considered as EPA and MDHES establish cleanup goals for the Clark Fork sites.

5.0 PROBLEMS AND PRIORITIES: ESTABLISHING DYNAMIC SCHEDULES

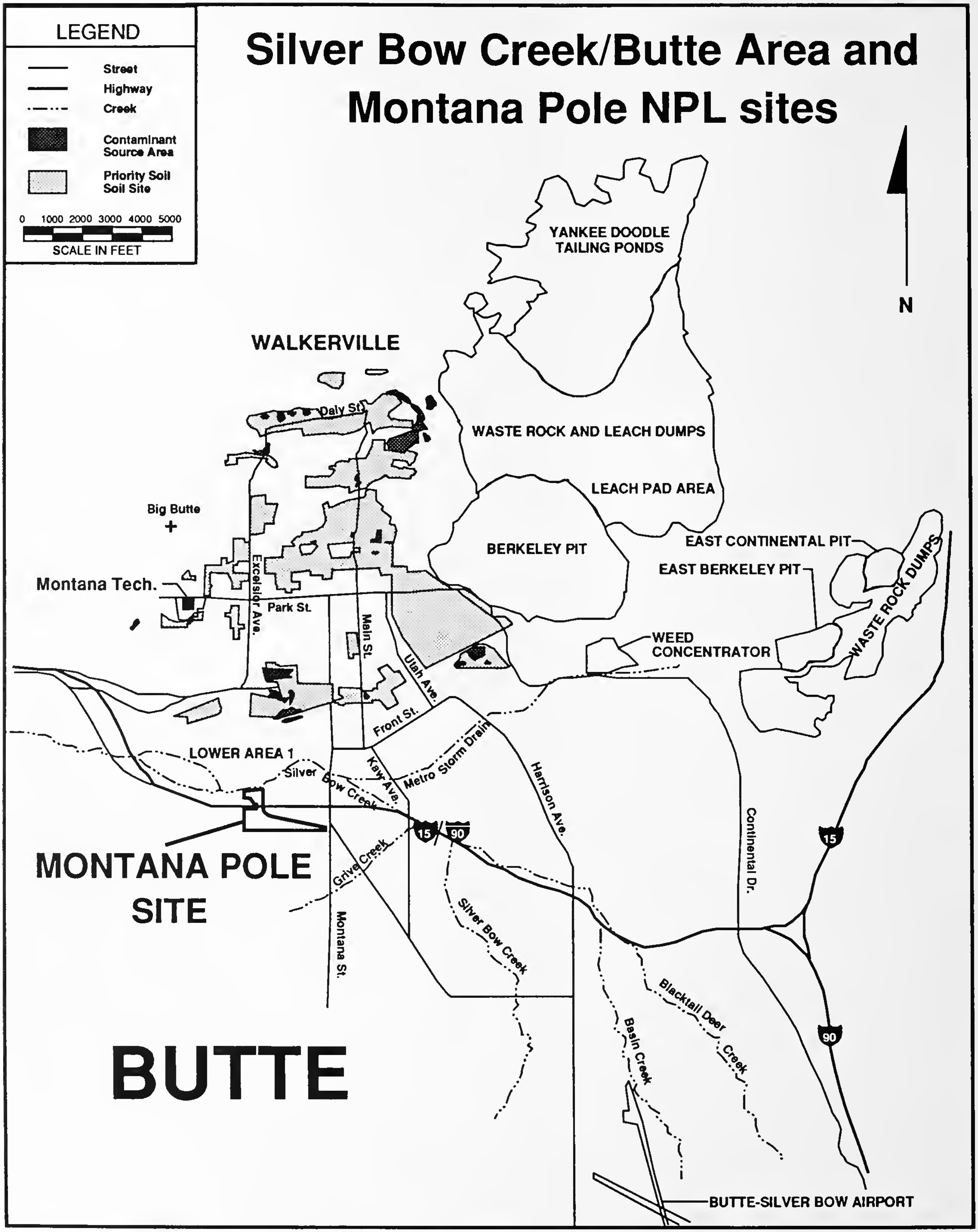
During preliminary investigations of potential contamination in the Clark Fork basin, EPA and MDHES identified 77 potential problems due to past mining, smelting, and wood treating activities at the four sites. EPA and MDHES have consolidated the 77 problems into 28 operable units. The criteria EPA and MDHES used to designate operable units are:

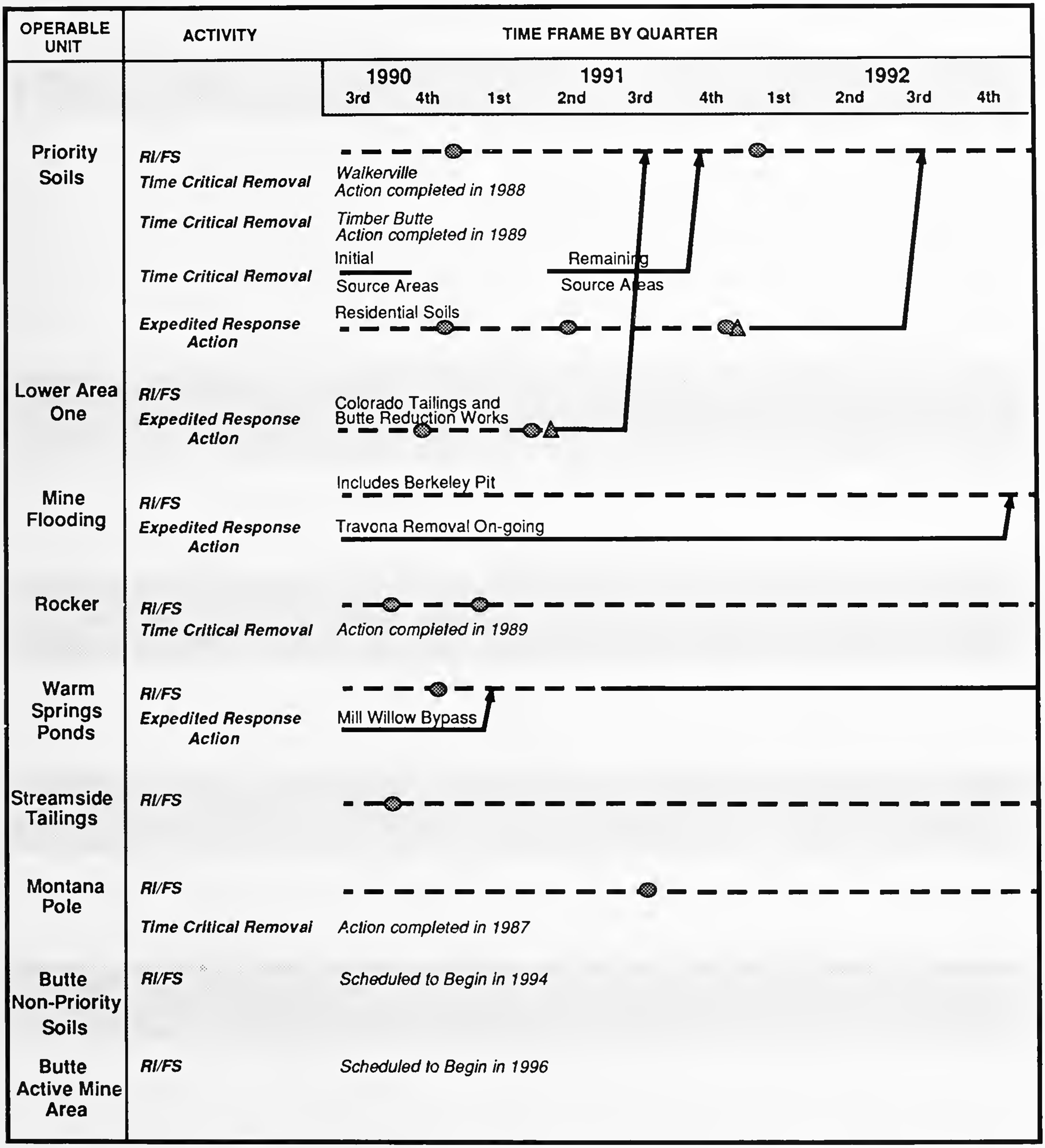
- Areas with similarly contaminated media (i.e., soils, flue dust, or ground water, etc.);
- Areas in a similar geographic location;
- Areas that will be cleaned up using similar techniques;
- Areas that will be cleaned up within a similar time frame; and
- Areas that can be managed and addressed in a single remedial investigation and feasibility study.

As a common practice, EPA usually investigates and cleans up operable units individually. However, EPA and MDHES may redefine or reorder the ranking of operable units as more information becomes available. Flexibility gives the agencies the ability to approach environmental problems in the most efficient and informed manner.

5.1 The Issues: Deciding the Sequence of Work

The process of setting priorities and establishing a sequence begins in the upper reaches of the Clark Fork basin and moves downstream through the identified Superfund operable units. Priority for initial action in the upper part of the basin has been to reduce human exposures to contaminated mining, milling, and smelting wastes. The removal actions at Walkerville, Timber Butte, and Rocker, and the early work to identify priority contaminated areas in Butte, reflect this focus. Likewise, the relocation of Mill Creek residents, the provision of a new water supply for Milltown residents, and the accelerated investigations at the Anaconda Old Works near residential areas all reflect


LEGEND
Street
Highway
Creek
Contaminant Source Area
Priority Soil Soil Site
0 1000 2000 3000 4000 5000
SCALE IN FEET
Silver Bow Creek/Butte Area and Montana Pole NPL sites
N
YANKEE DOODLE TAILING PONDS
WALKERVILLE
Daly St.
WASTE ROCK AND LEACH DUMPS
LEACH PAD AREA
Big Butte
BERKELEY PIT
EAST CONTINENTAL PIT
EAST BERKELEY PIT
WASTE ROCK DUMPS
Montana Tech.
Excelsior Ave.
Park St.
Main St.
Utah Ave.
WEED CONCENTRATOR
Front St.
LOWER AREA 1
Silver Bow Creek
Kaw Ave.
Metro Storm Drain
Harrison Ave.
Continental Dr.
15
90
MONTANA POLE SITE
Grive Creek
Montana St.
Silver Bow Creek
Blacktail Deer Creek
Basin Creek
BUTTE
BUTTE-SILVER BOW AIRPORT



Abbreviated Schedule for Silver Bow Creek/ Butte Area Site and Montana Pole Site

Implementation

Investigation/Planning

Decision

Public Involvement Opportunity*

*Time frames for public involvement opportunities are approximate. The public is encouraged to stay involved throughout the process.

a concern for human health issues. Additional expedited response actions directed toward protection of human health may be taken at various locations if new data demonstrate the need for such action.

There were also several critical environmental problems that became an early focus of the Superfund process. These included seepage of organic waste from the Montana Pole Treating Plant into Silver Bow Creek, potential flooding from the Travona mine shaft, fish kills and potential dike failure in the Warm Springs Ponds area, and potential erosion of tailings into Warm Springs Creek at the Anaconda Old Works. All of these problems were given priority on a site-specific basis because they posed significant threats to the environment.

The initial Master Plan prepared in October 1988 established priorities among the operable units then identified in the upper basin. These priorities were based on present or potential adverse impacts to human health or the environment.

Human health concerns appear to be appropriately addressed with the priority they warrant. Both time-critical and non-time-critical removal actions are planned or underway in Butte (Butte Priority Soils) and Anaconda (Anaconda Old Works) to reduce the human health risks associated with contaminated soils. Resolution of human health concerns should have an overall positive impact on the river system because surface runoff and ground water inputs will generally be improved.

The primary sequencing question relates to the environmental aspects of the Clark Fork basin. The agencies want to remediate upstream sources of contamination before downstream areas. This allows for more informed decisions about the need for and type of remediation at downstream areas that receive contaminants from upstream sources.

The following three sections describe the issues and future activities at the Clark Fork sites. The description for the Montana Pole site is included below within the Silver Bow Creek/Butte Area site. In order to clarify the issues and future activities, there are abbreviated schedules of the Clark Fork sites on pages 10, 13 and 16. These schedules present near-term activities that are shown in greater detail in the comprehensive schedules which begin on page 21.

5.1.1 Silver Bow Creek/Butte Area Site

In evaluating remedial activities underway in the Butte and Silver Bow Creek source areas, (see map on page 10), we see that:

- Potential mine flooding discharges are being addressed through the Mine Flooding remedial investigation and feasibility study;

- Contaminated alluvial ground water will be addressed primarily through the Area One remedial investigation and an expedited response action at the Lower Area One;

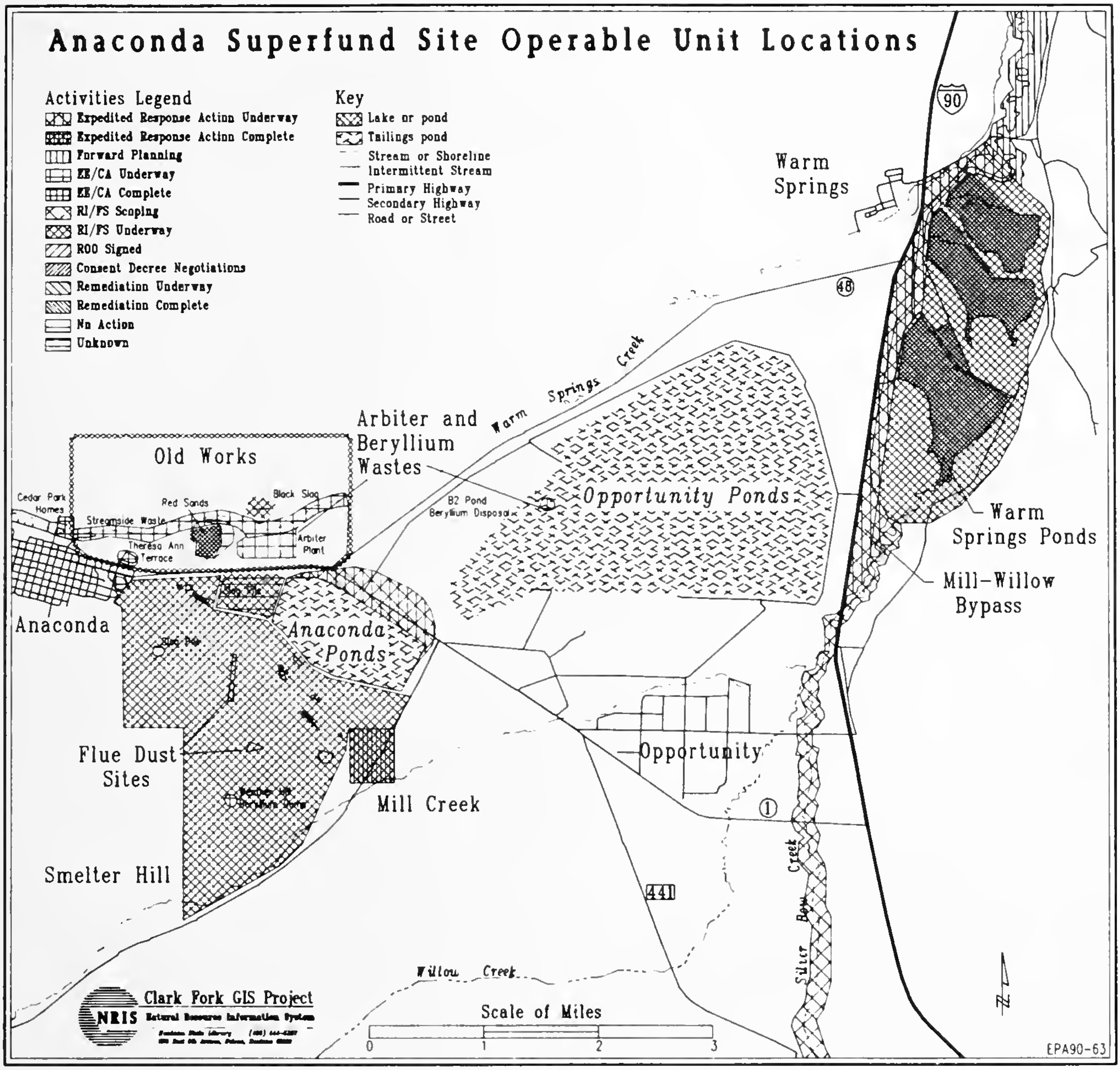
- Storm water runoff will be addressed during Phase 2 of the Butte Priority Soils remedial investigation and feasibility study; and

- Erosion of flood plain tailings is being addressed in the Streamside Tailings and Revegetation Studies program and the Streamside Tailings and Rocker remedial investigations and feasibility studies.

These investigations will be closely coordinated. The recent change to a single lead agency (EPA) at all these areas (except for Streamside Tailings) should facilitate this coordination. All investigations are expected to culminate in final cleanup decisions within the next two to four years. It is expected that major progress toward implementation of remedies at these upstream source areas can be achieved within a subsequent two-year construction period.

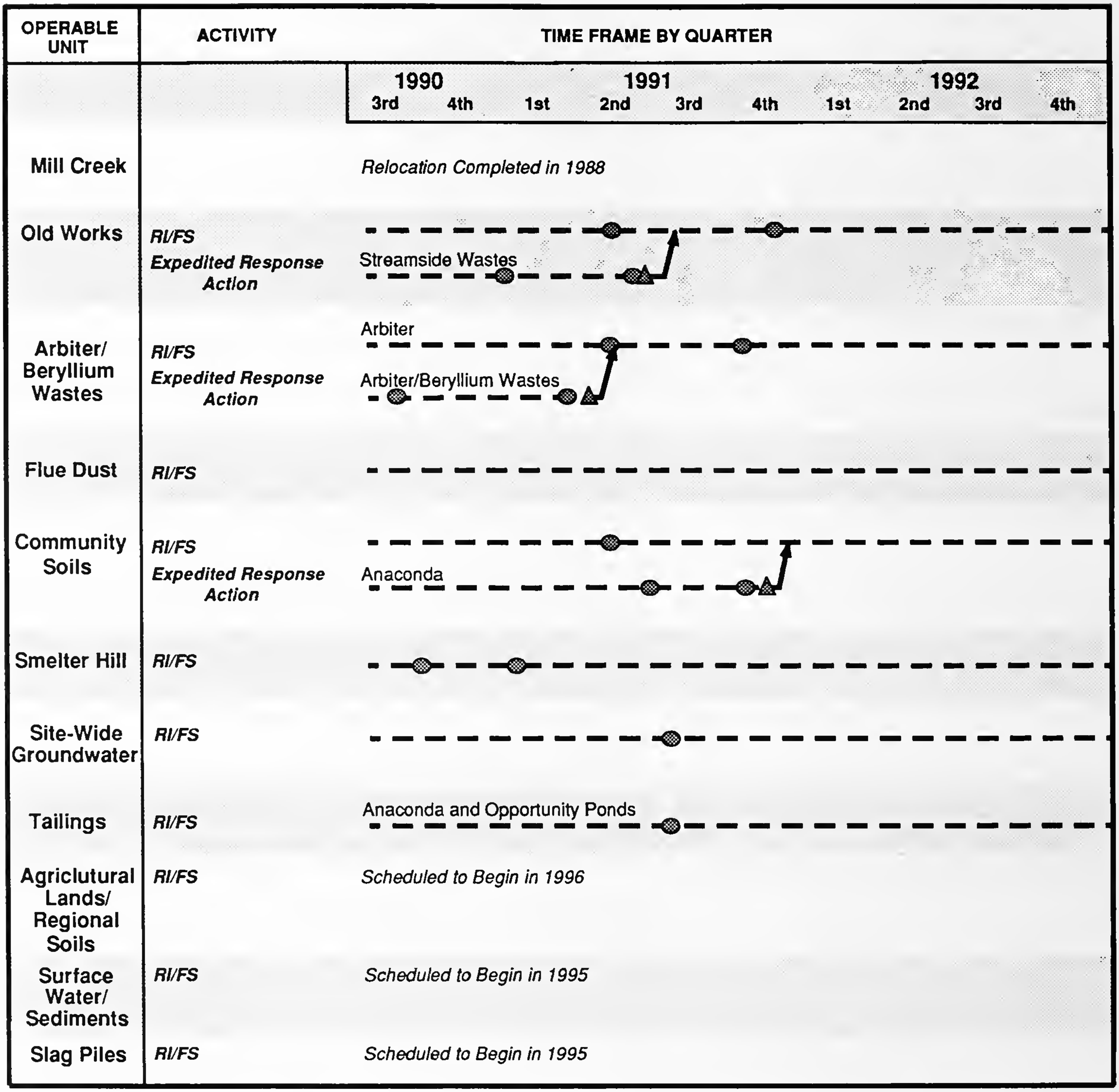
Moving downstream, the Warm Springs Ponds receive metals from surface and ground water at various locations along Silver Bow Creek. In addition, during higher flows, significant amounts of tailings and sediments from the immediate Silver Bow Creek stream banks are washed into the ponds or by-passed around the ponds. The Mill-Willow Bypass, which is highly contaminated with metal salts, likely contributes significantly to fish kills in the Clark Fork during storm runoff. Also, the dikes surrounding the ponds also are not protected sufficiently against major floods or earthquakes. There is also a contaminated ground water ***plume*** downstream from the ponds.

The agencies decided to address the immediate concerns at the ponds (dike stability, Mill-Willow Bypass contamination) through a removal before the record of decision is issued for the overall Warm Springs Ponds remedial action. A more comprehensive solution (improved treatment capability, consolidation and capping of contaminated tailings and soils, ground water treatment, etc.) will be defined and implemented through the record of decision.

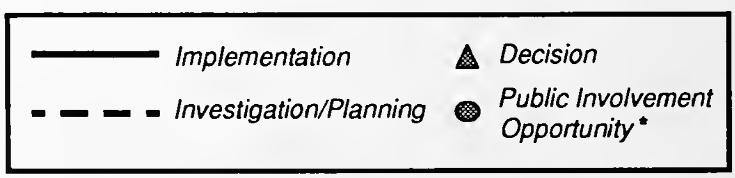


Final action at Warm Springs Ponds depends on treatment of upstream sources of contamination and success of the interim improvements mentioned above. The degree of success in upstream control efforts will determine what the *final* remedy at the ponds may be. If Silver Bow Creek contaminants are controlled, the current practice of diverting the creek through the ponds to channel contaminants may be discontinued and consideration given to treatment of the pond sediments or to the appropriate method for wet or dry pond closure. Evaluation of upstream controls and their effect on the ponds is shown at five-year intervals on the Master Schedules.

When viewed as a whole, it appears that near-term cleanup efforts in Butte and at the Warm Springs Ponds should have a very positive impact on the upper Clark Fork during all but the greatest storm runoff periods (floods greater than a ***100-year flood***). Additional time will likely be needed to achieve better control of adverse impacts from larger floods.



Abbreviated Schedule for Anaconda Smelter Site



*Time frames for public involvement opportunities are approximate. The public is encouraged to stay involved throughout the process.

5.1.2 Anaconda Smelter Site

The most likely source of contamination to the Clark Fork basin from the Anaconda Smelter site is probably the Old Works tailings (see map on page 13). These wastes lie next to Warm Springs Creek and tend to erode into the stream during storm runoff. An engineering evaluation and cost analysis is presently being conducted for several high priority areas within the Old Works operable unit to reduce risks to human health and the environment. Ground water data collection is anticipated to provide additional information so that a response action can be taken at the Old Works operable unit. The possibility of including the Arbiter along with response actions at the Old Works should also be considered.

Related to the Warm Springs Ponds contamination problem is the ground water that enters these ponds from the Opportunity Ponds located just to the west. To date, there is inadequate information on ground water beneath the Opportunity Ponds to determine what response action is required. However, future evaluations of the effectiveness of the remedy at the Warm Springs Ponds should consider any impact from the Opportunity Ponds, both before and after response actions are taken at the Opportunity Ponds.

Contamination from wastes that are scattered over many square miles surrounding the smelter will be addressed through present and planned activities at various defined operable units.

5.1.3 Milltown Reservoir Site

Two contamination problems exist at Milltown: 1) a contaminated ground water plume downgradient from the reservoir sediments; and 2) contaminated sediments behind the dam (see map on page 16). The agencies want to know how much contamination from upstream sources is likely to move into the reservoir before deciding how to remedy these two concerns. This question will be at least partially answered by an analysis of water quality data to be collected at the Clark Fork gaging stations. This is planned during the ongoing remedial investigation and feasibility study at the Milltown Reservoir. In addition, the Clark Fork River operable unit remedial investigation and feasibility study will address this issue. These evaluations must be closely coordinated.

The Milltown Reservoir remedial investigation and feasibility study will seek answers to several major questions:

- What is the stability of the reservoir sediments and the associated metals under different reservoir operational schemes and river flow regimes?

- What is the current extent and potential impact of the contaminated ground water plume?

- What are the present and potential sediment and associated metal loads entering the reservoir during various river flow scenarios?

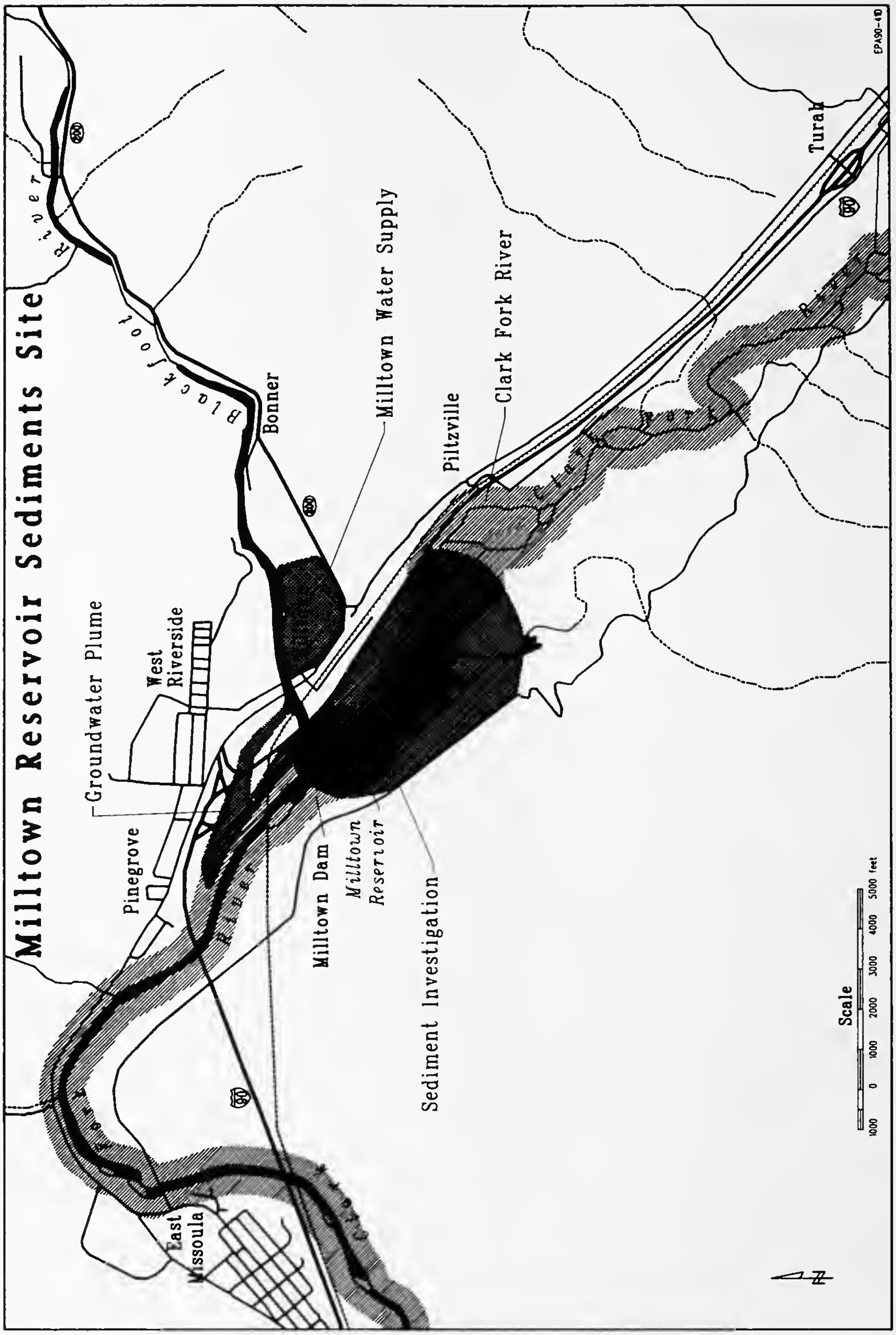
- What are the existing or potential impacts on the Milltown Reservoir environment?

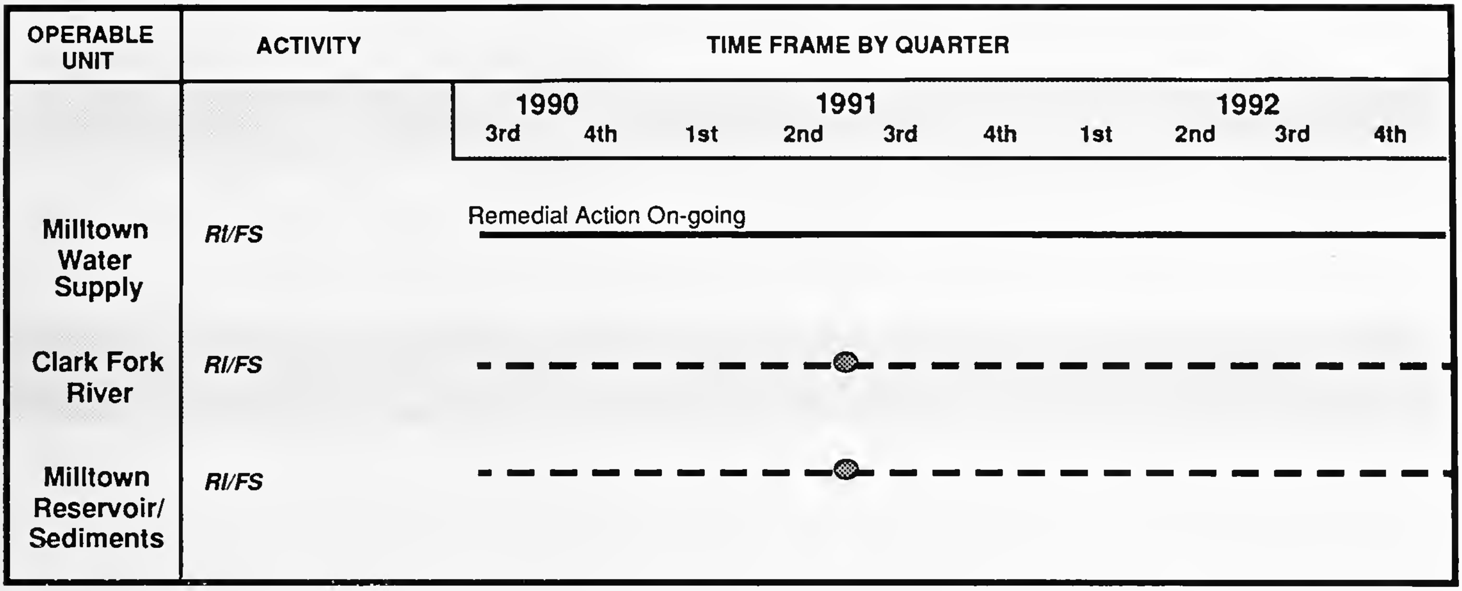
The appropriate time for implementing a remedy at Milltown Reservoir can only be determined after completion of additional site investigation activities at the reservoir and remedial activities upstream in Silver Bow Creek and the Clark Fork. The uncertainty about upstream impacts would suggest a possible need for a phased remedy at Milltown Reservoir.

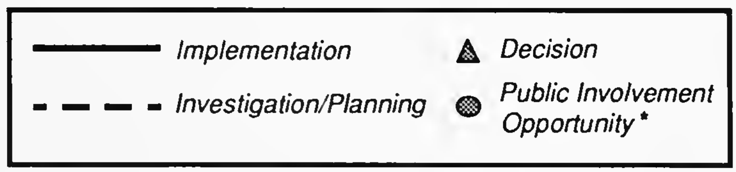
5.1.3.1 Clark Fork River Operable Unit

EPA and MDHES have reorganized operable units to move responsibility for the Clark Fork River operable unit from the Silver Bow Creek/Butte Area site to the Milltown Reservoir site. The Clark Fork River operable unit stretches downstream from the confluence of the discharge from the Warm Springs Ponds to the Milltown Reservoir. The area is affected by a number of environmental problems. Where Warm Springs Creek enters and becomes the Clark Fork, it provides generally good quality water and sustains a trout population immediately below the confluence. However, the next 20- to 30-mile river segment shows general deterioration of the fishery and water quality, and there are many obvious areas of tailings deposits.

Although there is a general improvement in the fishery farther downstream toward Missoula, mining-related wastes still impact the river adversely. The agencies want to know how much contamination from mining, milling, and smelting wastes is either presently or potentially adversely affecting the Clark Fork. The Clark Fork ***Screening Study,*** anticipated to be completed in September 1990, will help answer this question; however, further study will be needed to better understand the present and future movement of contaminated sediment and dissolved metals downstream into Milltown Reservoir. Recognizing this need, EPA plans to initiate a remedial investigation and feasibility study on the Clark Fork River operable unit in 1991.


Milltown Reservoir Sediments Site
Groundwater Plume
West Riverside
Pinegrove
Bonner
Blackfoot River
Milltown Water Supply
Piltzville
Clark Fork River
Turah
Milltown Dam
Milltown Reservoir
Sediment Investigation
East Missoula
Clark Fork River
Scale
1000 0 1000 2000 3000 4000 5000 feet
N
EPA90-410





Abbreviated Schedule for Milltown Reservoir Site

*Time frames for public involvement opportunities are approximate. The public is encouraged to stay involved throughout the process.

While the EPA is studying the many factors that contribute to the environmental problems of the Clark Fork, an ARCO-funded reclamation demonstration project is currently underway immediately downstream from the ponds. It is evaluating several alternative actions, including:

- Selective tailings removal;
- Streambank stabilization;
- Addition of lime to reduce metals mobility; and
- Revegetation of tailings and contaminated soils.

EPA and MDHES will incorporate into the Clark Fork River operable unit remedial investigation and feasibility study all appropriate information gained through the Streamside Tailings and Revegetation Studies initiated in 1988 and the ARCO-funded Clark Fork Reclamation Demonstration project. Information gained through these activities and investigations will play a role in the future plans for the Milltown Reservoir cleanup.

5.2 The Choices: Establishing Priorities

Because so many problems must be addressed at the four sites and EPA has limited resources available, the agencies have established priorities to ensure that the most serious threats to human health and the environment are dealt with first. Presented in Table 1 are the criteria EPA and MDHES used to categorize operable units according to the level of priority each would receive in the sequence of remedial responses.

Evaluation of the problems posed by each operable unit resulted in the ranking presented in Table 2. The agencies recognize that some operable units have contamination problems that pose varying degrees of risk to human health and the environment and should be addressed with response actions appropriate to the degree of risk. Other operable units have contamination that may develop into problems only after long-term exposure. EPA and MDHES intend to respond later to contamination that presents less of a risk.

5.3 The Schedules: Defining an Orderly Approach

The overall schedules of Superfund cleanup activities reflect the major theme of this Master Plan: logical sequencing of activities. The schedules reflect both "best estimates" and detailed enforceable

TABLE 1.
CRITERIA FOR ESTABLISHING OPERABLE UNIT PRIORITIES

Criteria for Establishing High Cleanup Priority

1. High potential for exposure to humans.
2. High potential for exposure to the environment.
3. Cleanup required in order to fully study and address other operable units.

Criteria for Establishing Intermediate Cleanup Priority

1. Moderate potential for exposure to humans.
2. Moderate potential for exposure to the environment.
3. Potential that cleanup efforts could recontaminate operable units located downstream, ***downgradient***, or downwind.
4. Unusual complexity of problems that could require lengthy evaluation.

Criteria for Establishing Low Cleanup Priority

1. Currently low potential for exposure to humans.
2. Currently low potential for exposure to the environment.
3. Potential for higher levels of exposure in the future,
4. Low risk of off-site contamination.

sequencing presently incorporated in the administrative orders among the potentially responsible parties, the state, and EPA. The schedules depict key phases of both removal and remedial activities.

There can be up to 14 steps for remedial investigations and feasibility studies. Although these are intended to be fairly self-explanatory, it should be pointed out that the "scoping" phase can include early site investigations, such as screening studies. Such early activities can support later site characterization work and lead to faster remedy selection.

The schedules show connecting lines between operable units where interrelationships are expected to occur. Certain information collected at one operable unit may be useful at another operable unit.

In Butte, the schedules for investigation and remediation of contaminated soils proceed through a sequence of time-critical removal actions on waste sources, expedited response actions in residential areas, and final remedial action on the remaining areas in Butte that may have human health or environmental concerns. An ***action level*** for cleanup of contaminated soil in residential areas will be established through this process.

There are also environmental concerns (storm water runoff and alluvial ground water contamination) associated with the Butte soils. These water-related issues will be addressed concurrently with contaminated soils and mine flooding (Berkeley Pit) issues, perhaps in the form of a broad record of decision.

Finally, Lower Area One (which includes Colorado Tailings, Butte Reduction Works, and manganese stock piles) is being addressed through an expedited response action in the 1990-1991 time frame. The effectiveness of the expedited response action will be evaluated as part of the Butte Priority Soils remedial investigation and feasibility study.

The Montana Pole and Rocker organic contamination problems will be addressed during the same time frame so that information on possible treatment technologies can be shared. This should lead to a faster final decision on the selected remedy.

At the same time, the streamside tailings project will be evaluating alternatives to prevent continued releases of tailings into Silver Bow Creek. There will be close coordination of activities at the Rocker and Streamside Tailings operable units to take advantage of similar investigations.

TABLE 2.

PROPOSED LIST OF PRIORITIES FOR CLARK FORK OPERABLE UNITS*

HIGH PRIORITY OPERABLE UNITS

Silver Bow Creek/Butte Area NPL Site

✓**Priority Soils**
- —Walkerville - Time Critical Removal
- —Timber Butte - Time Critical Removal
- —Other Priority Waste Sources - Time Critical Removal
- —Residential Soils - Expedited Response Action

✓**Lower Area One**
- —Expedited Response Action
- —Lower Area One - RI/FS

✓**Mine Flooding**
- —Travona - Expedited Response Action
- —Berkeley Pit - RI/FS

✓**Rocker**
- —Time Critical Removal
- —RI/FS

✓**Warm Springs Ponds**
- —Mill-Willow Bypass - Expedited Response Action
- —RI/FS

Milltown Reservoir NPL Site

✓**Milltown Water Supply** (replaced 1985)

Anaconda Smelter NPL Site

✓**Mill Creek** - RI/FS

✓**Old Works**
- —Streamside Wastes - Expedited Response Action

✓**Arbiter/Beryllium Wastes**
- —Expedited Response Action

✓**Flue Dust** - RI/FS

✓**Community Soils**
- —Anaconda - Expedited Response Action

Montana Pole NPL Site

✓**Montana Pole**
- —Time Critical Removal
- —RI/FS

INTERMEDIATE PRIORITY OPERABLE UNITS

Silver Bow Creek/Butte Area NPL Site

✓**Priority Soils** - RI/FS
✓**Streamside Tailings** - RI/FS

Milltown Reservoir NPL Site

Clark Fork River - RI/FS
Milltown Reservoir/Sediments - RI/FS

Anaconda Smelter NPL Site

✓**Smelter Hill** - RI/FS
Community Soils - RI/FS
Old Works - RI/FS
Arbiter/Beryllium Wastes
- —Arbiter - RI/FS

Site-Wide Ground Water - RI/FS

LOW PRIORITY OPERABLE UNITS

Silver Bow Creek/Butte Area NPL Site

Butte Non-Priority Soils - RI/FS
Butte Active Mine Area - RI/FS

Anaconda Smelter NPL Site

Tailings
- —Anaconda and Opportunity Ponds - RI/FS

Surface Water/Sediments - RI/FS
Agricultural Lands/Regional Soils - RI/FS
Slag Piles - RI/FS

*Work on operable units shown with a ✓ has begun or is completed.

A major remedy is being implemented at the Warm Springs Ponds with cleanup of the Mill-Willow Bypass and dike stabilization in 1990. The cleanup remedy selected in the record of decision, scheduled for fall 1990, will significantly improve the pond system. Follow-up water quality monitoring during all types of natural flow situations will be needed to measure the effectiveness of cleanup activities.

The agencies consider interim upgrading of the Warm Springs Ponds a satisfactory remedy only if it is coupled with long-lasting treatment of the streamside tailings. EPA will evaluate the effectiveness of the remedies implemented at Silver Bow Creek and the Warm Springs Ponds a minimum of every five years. If tailings and associated metals continue to enter Silver Bow Creek and the Warm Springs Ponds, additional remedial action may be necessary.

The schedules show that investigations will be initiated along the Clark Fork to determine potential impacts that may affect remedial decisions at Milltown Reservoir. If conducted, an ecological risk assessment will include both the Clark Fork and Milltown Reservoir. As these studies progress, it will become clearer what interim or final remedial actions should be taken at Milltown Reservoir.

EPA and MDHES have prepared detailed schedules providing the sequence of study and cleanup activities that will take place at the Clark Fork sites. The agencies will continue to address the more immediate problems while also identifying and implementing permanent remedies. The reader should recognize that these schedules are the agencies' best estimates at this point in time. There are many factors that could cause these projected schedules to be reevaluated and changed.

The Master Schedules that appear between pages 21 and 27 encompass the long-term scope of activities to be completed on the various operable units at the Clark Fork Superfund sites. The schedules track the Superfund activities from 1990 through 2003 and show how these activities are coordinated among the operable units on a site-by-site basis. These schedules include the key phases of both "removal" and "remedial" activities and are the foundation of the Master Plan. (See discussion, page 4)

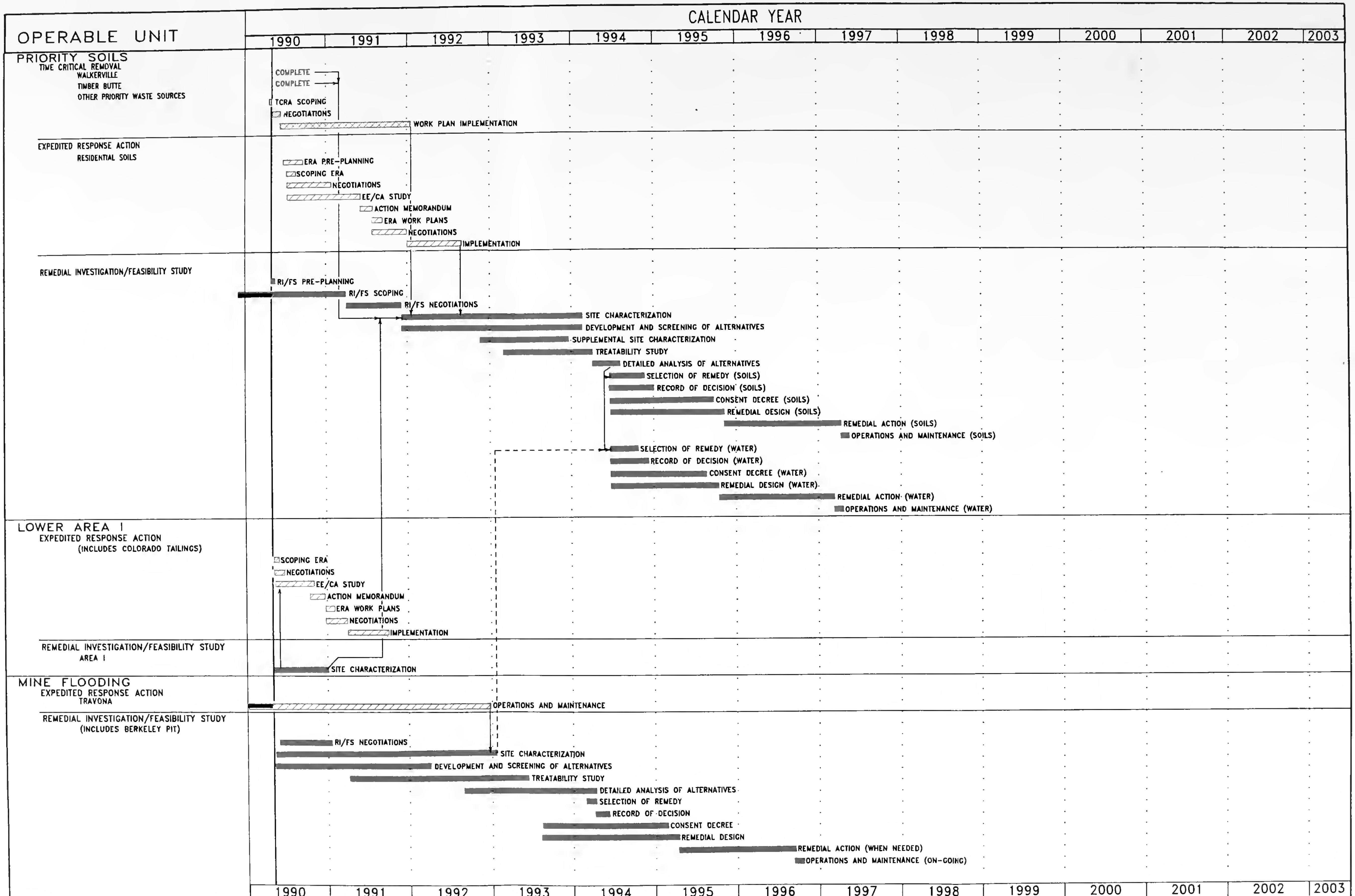
The activity bars on the schedules represent estimates of the time it will take (duration) from initiation of an activity to its completion. The colors of the bars indicate whether the activity is part of a removal action (time critical or expedited response action) or part of a remedial action (remedial investigation and feasibility study, remedial design, or remedial action). The schedules show connecting lines between operable units where interrelationships exist.

Technical terms used in the comprehensive schedules are defined in the glossary.

These Master Schedules summarize current, planned, and anticipated activities at the Clark Fork sites. They are dynamic and can be revised easily if issues and plans change and if new information becomes available. EPA plans to monitor the progress on each operable unit at regular intervals. The progress will be indicated on the Master Schedules defined by the general legend. This updating and monitoring flexibility will allow EPA and MDHES to keep all interested parties informed as to the progress and status of the work related to each operable unit.

6.0 CONCLUSION

The Superfund process makes promises difficult: too many activities are subject to change, re-scheduling, or other hard-to-plan-for eventualities. However, in presenting this second edition of the Clark Fork Superfund Sites Master Plan, EPA and MDHES commit themselves to pursuing logical, efficient, and effective cleanup of Silver Bow Creek/Butte Area, Montana Pole, Anaconda Smelter, and Milltown Reservoir. With continued cooperation from potentially responsible parties and increased public involvement in the process, the schedules presented here may represent the reality of Superfund cleanup in Montana.



Legend:

Summary Bar

Progress Bar

ACTION

TIME CRITICAL REMOVAL ACTION

EXPEDITED RESPONSE ACTION (NON TIME CRITICAL)

GENERAL RI/FS/RD/RA

CLARK FORK SUPERFUND SITES

MASTER SCHEDULE

Original Logic: 1MAY90

Logic Revision: None

U.S. ENVIRONMENTAL PROTECTION AGENCY

and

MONTANA DEPARTMENT of HEALTH and ENVIRONMENTAL SCIENCES

BUTTE AREA OF THE SILVER BOW CREEK NPL SITE

Sverdrup

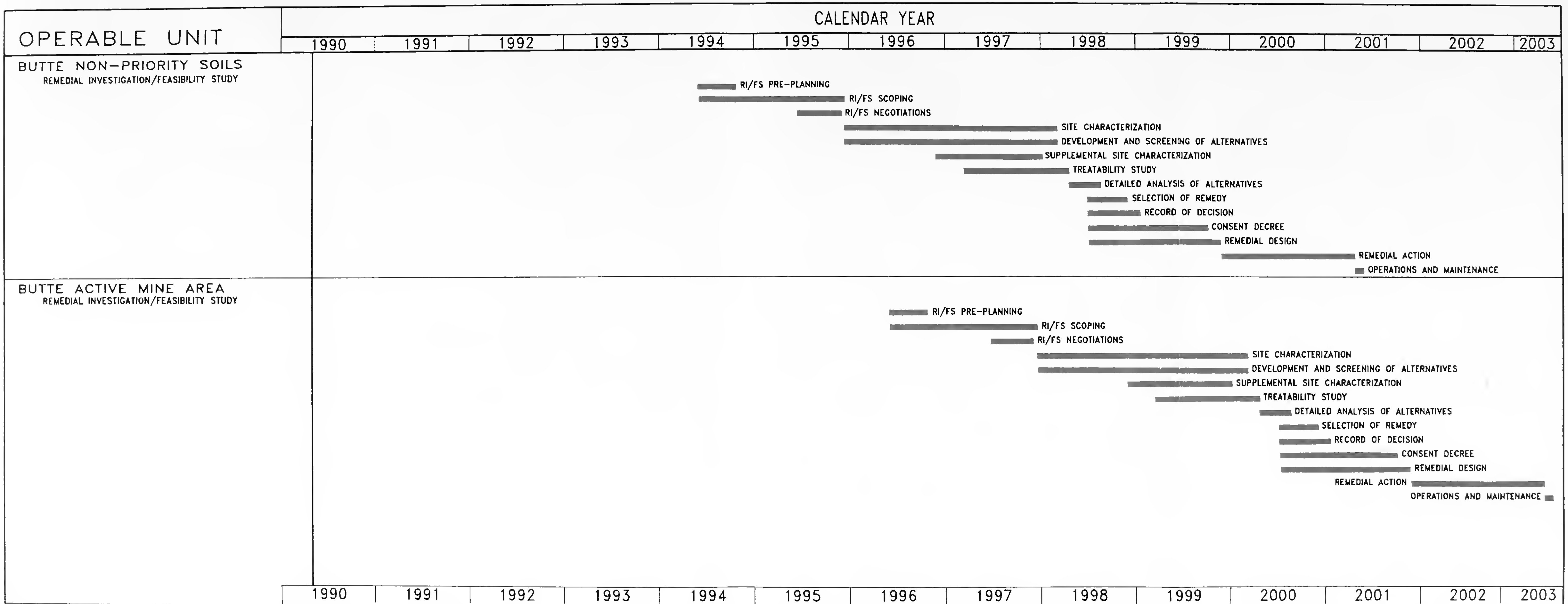
CORPORATION

SAINT LOUIS, MISSOURI

Progress: 1MAY90

Plot Date: 10AUG90

Sheet 1 of 2



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Summary Bar
Progress Bar

ACTION
TIME CRITICAL REMOVAL ACTION
EXPEDITED RESPONSE ACTION (NON TIME CRITICAL)
GENERAL RI/FS/RD/RA

CLARK FORK SUPERFUND SITES

MASTER SCHEDULE

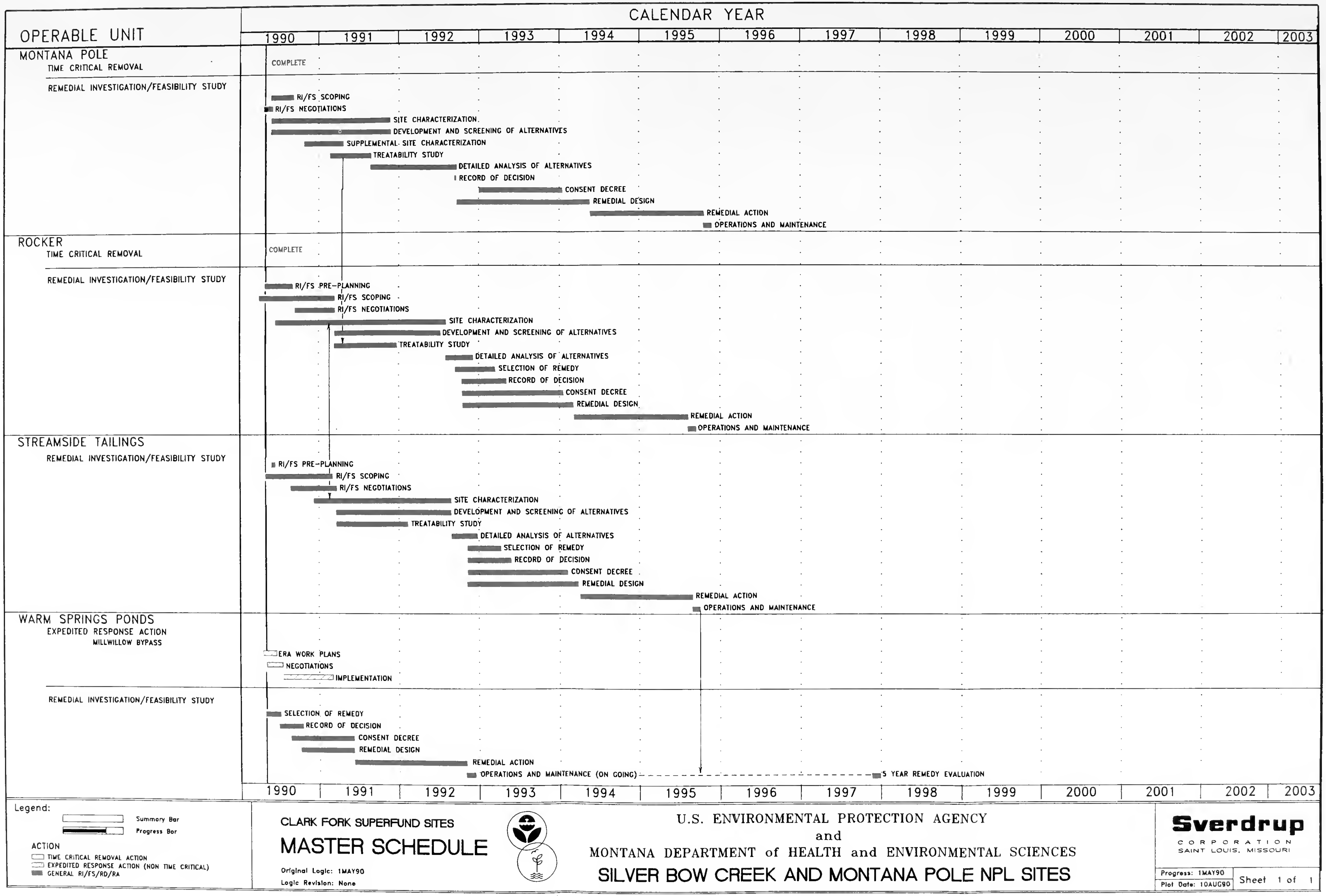
Original Logic: 1MAY90
Logic Revision: None

U.S. ENVIRONMENTAL PROTECTION AGENCY
and
MONTANA DEPARTMENT of HEALTH and ENVIRONMENTAL SCIENCES

BUTTE AREA OF THE SILVER BOW CREEK NPL SITE

Sverdrup
CORPORATION
SAINT LOUIS, MISSOURI

Progress: 1MAY90
Plot Date: 10AUG90
Sheet 2 of 2



CLARK FORK SUPERFUND SITES

MASTER SCHEDULE

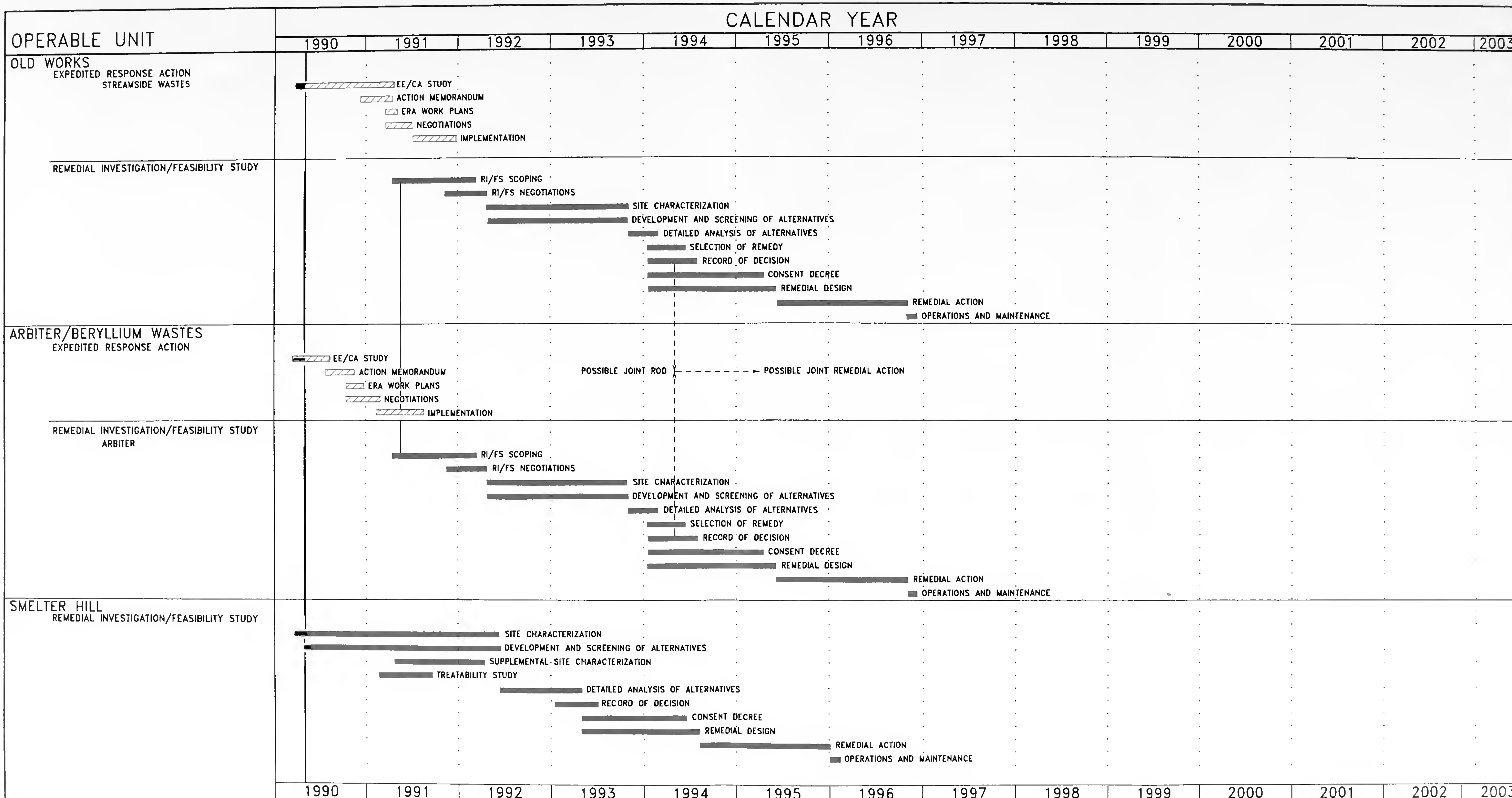
Original Logic: 1MAY90
Logic Revision: None

U.S. ENVIRONMENTAL PROTECTION AGENCY
and
MONTANA DEPARTMENT of HEALTH and ENVIRONMENTAL SCIENCES

SILVER BOW CREEK AND MONTANA POLE NPL SITES

Sverdrup
CORPORATION
SAINT LOUIS, MISSOURI

Progress: 1MAY90
Plot Date: 10AUG90
Sheet 1 of 1



Legend:
Summary Bar
Progress Bar

ACTION
TIME CRITICAL REMOVAL ACTION
EXPEDITED RESPONSE ACTION (NON TIME CRITICAL)
GENERAL RI/FS/RD/RA

CLARK FORK SUPERFUND SITES

MASTER SCHEDULE

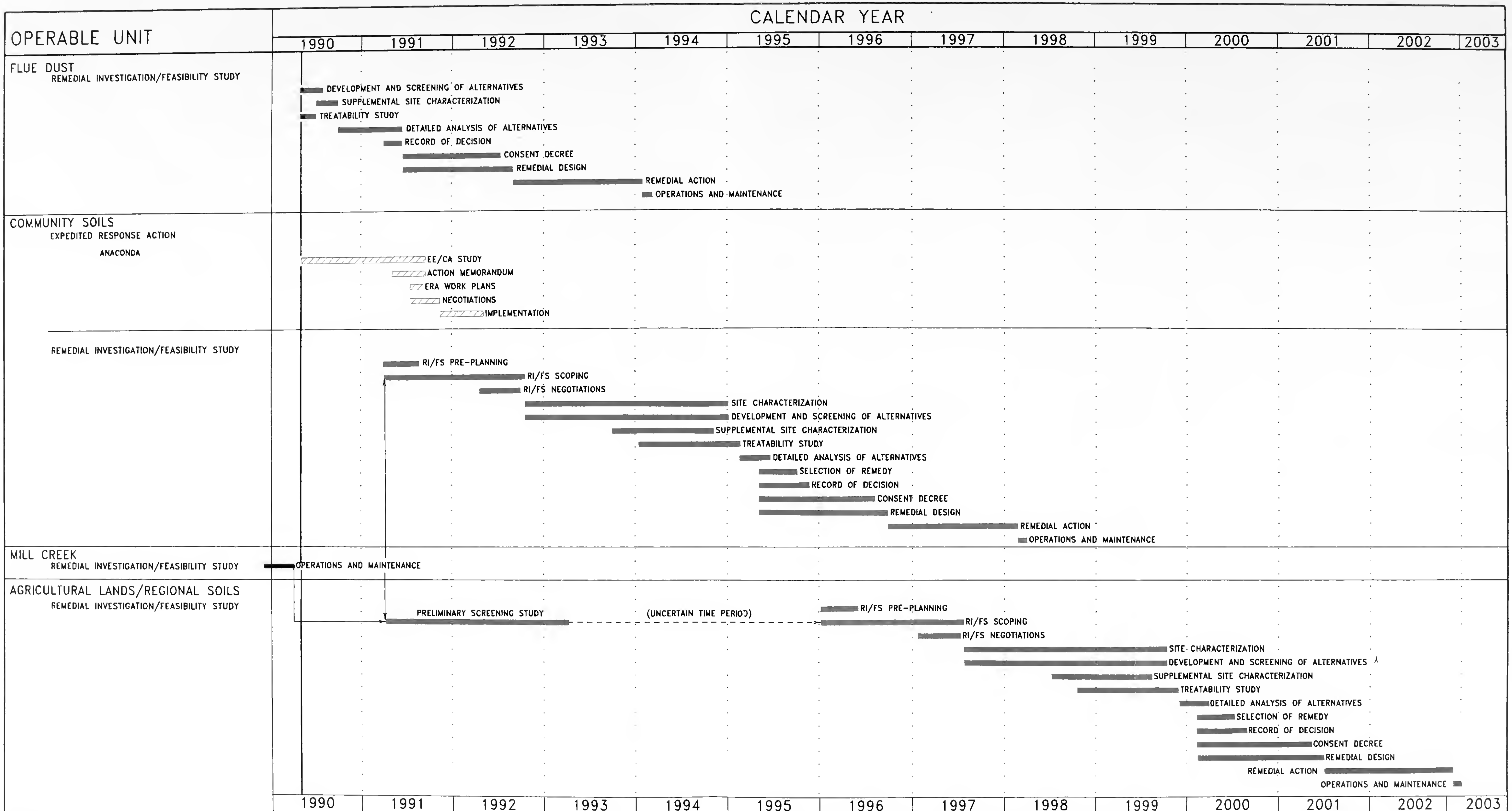
Original Logic: 1MAY90
Logic Revision: None

U.S. ENVIRONMENTAL PROTECTION AGENCY
and
MONTANA DEPARTMENT of HEALTH and ENVIRONMENTAL SCIENCES

ANACONDA SMELTER NPL SITE

Sverdrup
CORPORATION
SAINT LOUIS, MISSOURI

Progress: 1MAY90
Plot Date: 10AUG90
Sheet 1 of 3



Legend:
Summary Bar
Progress Bar
ACTION
TIME CRITICAL REMOVAL ACTION
EXPEDITED RESPONSE ACTION (NON TIME CRITICAL)
GENERAL RI/FS/RD/RA

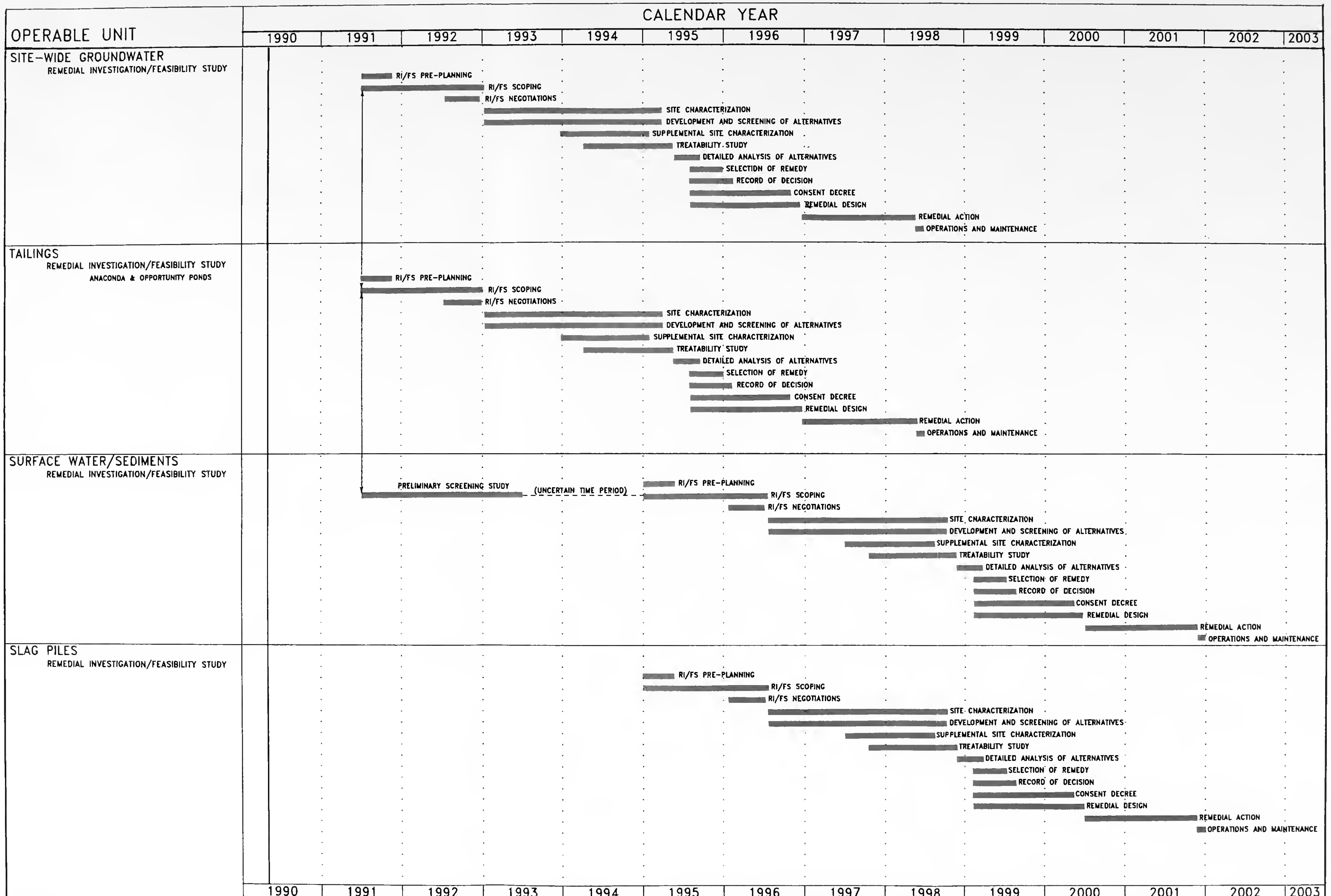
CLARK FORK SUPERFUND SITES
MASTER SCHEDULE

Original Logic: 1MAY90
Logic Revision: None

U.S. ENVIRONMENTAL PROTECTION AGENCY
and
MONTANA DEPARTMENT of HEALTH and ENVIRONMENTAL SCIENCES
ANACONDA SMELTER NPL SITE

Sverdrup
CORPORATION
SAINT LOUIS, MISSOURI

Progress: 1MAY90
Plot Date: 10AUG90
Sheet 2 of 3



Legend:

Summary Bar

Progress Bar

ACTION

TIME CRITICAL REMOVAL ACTION

EXPEDITED RESPONSE ACTION (NON TIME CRITICAL)

GENERAL RI/FS/RD/RA

CLARK FORK SUPERFUND SITES

MASTER SCHEDULE

Original Logic: 1MAY90

Logic Revision: None

U.S. ENVIRONMENTAL PROTECTION AGENCY
and
MONTANA DEPARTMENT of HEALTH and ENVIRONMENTAL SCIENCES

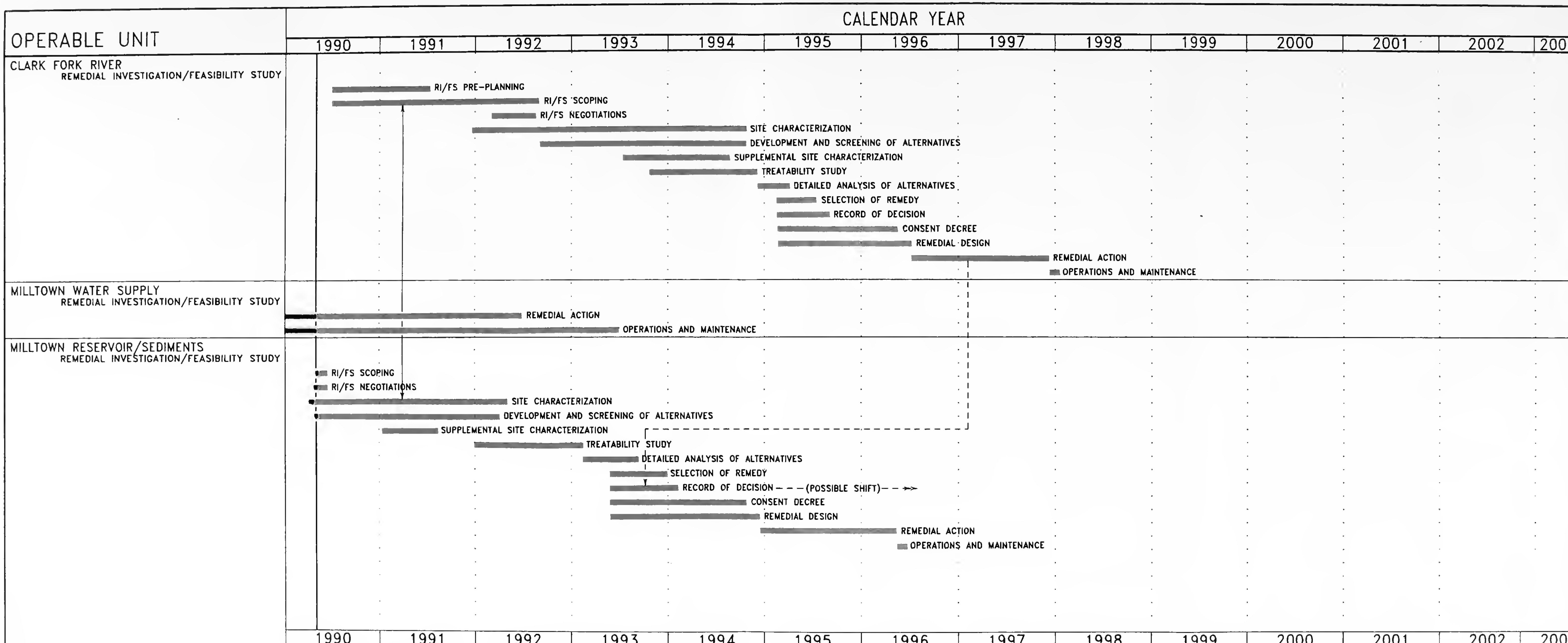
ANACONDA SMELTER NPL SITE

Sverdrup
CORPORATION
SAINT LOUIS, MISSOURI

Progress: 1MAY90

Plot Date: 10AUG90

Sheet 3 of 3



Legend:

Summary Bar

Progress Bar

ACTION

TIME CRITICAL REMOVAL ACTION

EXPEDITED RESPONSE ACTION (NON TIME CRITICAL)

GENERAL RI/FS/RD/RA

CLARK FORK SUPERFUND SITES

MASTER SCHEDULE

Original Logic: 1MAY90

Logic Revision: None

U.S. ENVIRONMENTAL PROTECTION AGENCY

and

MONTANA DEPARTMENT of HEALTH and ENVIRONMENTAL SCIENCES

MILLTOWN RESERVOIR NPL SITE

Sverdrup

CORPORATION

SAINT LOUIS, MISSOURI

Progress: 1MAY90

Plot Date: 10AUG90

Sheet 1 of 1

APPENDIX A

INFORMATION REPOSITORIES

MDHES and EPA have placed site documents for convenient public review in the following locations:

Montana College of Mineral Sciences & Technology Library
West Park Street
Butte, Montana 59701
(406) 496-4281
(Includes documents for Silver Bow Creek/Butte Area, Montana Pole, and Anaconda sites)

Hours:
Summer:

Monday-Friday	8:00 a.m.- 4:00 p.m.

Winter:

Monday-Thursday	8:00 a.m.-10:00 p.m.
Friday	8:00 a.m.- 5:00 p.m.
Saturday	9:00 a.m.- 5:00 p.m.
Sunday	1:00 p.m.-10:00 p.m.

Butte/EPA Office
Silver Bow County Courthouse
155 West Granite
Butte, Montana 59701
(406) 782-4452
(Includes documents for Silver Bow Creek/Butte Area and Montana Pole sites)

Hours:

Monday-Friday	8:00 a.m.- 5:00 p.m.

National Park Service Office
316 Main Street
P.O. Box 790
Deer Lodge, Montana 59722
(406) 846-3388 or (406) 846-2070
(Includes documents for Silver Bow Creek/Butte Area site)

Hours:

Monday-Sunday	9:00 a.m.- 5:30 p.m.

Mansfield Library
University of Montana
Missoula, Montana 59812
(406) 243-6860
(Includes documents for Montana Pole, Silver Bow Creek/Butte Area, and Milltown Reservoir sites)

Hours:
Summer:

Monday-Thursday	8:00 a.m.-10:00 p.m.
Friday	8:00 a.m.- 5:00 p.m.
Sunday	2:00 p.m.-10:00 p.m.

Winter:

Monday-Thursday	8:00 a.m.-11:00 p.m.
Friday	8:00 a.m.- 6:00 p.m.
Saturday	1:00 p.m.- 6:00 p.m.
Sunday	1:00 p.m.-11:00 p.m.

Missoula Public Library
301 East Main
Missoula, Montana 59802
(406) 721-2665
(Includes documents for downstream Silver Bow Creek and Milltown Reservoir sites)

Hours:
Summer:

Monday	10:00 a.m.- 6:00 p.m.
Tuesday-Thursday	10:00 a.m.- 9:00 p.m.
Friday	10:00 a.m.- 6:00 p.m.

Winter:

Tuesday-Thursday	10:00 a.m.- 9:00 p.m.
Friday and Saturday	10:00 a.m.- 6:00 p.m.

Butte-Silver Bow Library
106 West Broadway
Butte, Montana 59701
(406) 723-8262
(Includes documents for Silver Bow Creek/Butte Area and Montana Pole sites)

Hours:
Summer:

Monday	1:00 p.m.- 6:00 p.m.
Tuesday	12:00 p.m.- 6:00 p.m.
Wednesday-Saturday	9:00 a.m.- 6:00 p.m.

Winter:

Tuesday	12:00 p.m.- 9:00 p.m.
Wednesday	9:00 a.m.- 9:00 p.m.
Thursday-Saturday	9:00 a.m.- 6:00 p.m.

Hearst Free Library
401 Main Street
Anaconda, Montana 59711
(406) 563-6932
(Includes documents for Anaconda Smelter and Silver Bow Creek/Butte Area sites)

Hours:
Summer:

Tuesday-Thursday	10:00 a.m.- 7:00 p.m.
Friday and Saturday	10:00 a.m.- 5:00 p.m.

Winter:

Tuesday-Thursday	10:00 a.m.- 7:00 p.m.
Friday and Saturday	10:00 a.m.- 5:00 p.m.

Bonner School Library
9045 Highway 200
Box 4
Bonner, Montana 59823
(406) 258-6151
(Includes documents for Milltown Reservoir site)

Hours:
Summer: closed

Winter:

Monday-Friday	8:00 a.m.- 4:00 p.m.

Montana State Library
Capitol Complex
1515 East Sixth Avenue
Helena, Montana 59620
(406) 444-3115
(Includes documents for Silver Bow Creek/Butte Area, Montana Pole, and Milltown Reservoir sites)

Hours:

Monday-Friday	8:00 a.m.- 5:00 p.m.

U.S. Environmental Protection Agency
Federal Building
301 South Park
Helena, Montana 59626
(406) 449-5414
(Includes documents for all four Clark Fork Basin sites, in addition to all federal Superfund sites in Montana)

Hours:

Monday-Friday	7:30 a.m.- 5:30 p.m.

APPENDIX B

INITIAL ACCOMPLISHMENTS: MAKING PROGRESS IN THE CLARK FORK BASIN

Many human health and environmental problems at the four Clark Fork sites are the result of mining and smelting activities that have taken place in the Butte and Anaconda areas since 1864. Problems at the Montana Pole site and some contaminants at the Rocker operable unit of the Silver Bow Creek/Butte Area site relate to the use of ***organic compounds*** in wood treating activities.

EPA began initial investigations of the upper Clark Fork basin in 1982. Results of these investigations prompted EPA to place the Silver Bow Creek, the Anaconda Smelter, and the Milltown Reservoir sites on the Superfund National Priorities List in 1983. Following subsequent investigations, EPA added the Butte Area and upper Clark Fork between Deer Lodge and Milltown into the study area of the Silver Bow Creek site in 1987. Also in 1987, EPA added the Montana Pole site to the National Priorities List as a separate site. Wastes from the Montana Pole site had been addressed earlier in a removal under the Silver Bow Creek site.

EPA and MDHES have completed or have overseen completion of significant amounts of work at the four Superfund sites. What follows is a description of the sites, their operable units and problems, and studies and cleanups that have been conducted or are underway as of August 1990. These activities also are described in greater detail in technical documents and information sheets that EPA and MDHES have prepared for individual sites. For copies of information sheets, please contact either agency at the addresses shown on page 7.

SILVER BOW CREEK/BUTTE AREA SITE

The Butte and Walkerville area is the location of a very large ore body that has been mined for copper, lead, zinc, molybdenum, gold, and silver. The Butte gold rush began in 1864, when prospectors discovered gold in Baboon Gulch. By 1884, there were more than 300 operating copper and silver mines, 4,000 posted claims, nine silver mines, and eight smelters. Over the course of mining activities, more than 500 mines and shafts were developed, and several smelters and milling operations were added. The result is an estimated 3,000 miles of interconnected underground workings and approximately 150 major unreclaimed and reclaimed waste rock dumps. These dumps, covering approximately 350 acres, contain an estimated 9,850,000 cubic yards of waste. In addition, two major tailings piles, the Colorado Tailings and the Clark Tailings, encompass about 100 acres and contain an estimated 1,250,000 cubic yards of material. At least eleven silver mills and three major smelting operations also resulted in soil and water contamination throughout the Butte Hill mining area.

Remnants of Butte and Walkerville's mining history constitute a potential hazard to human health and the environment. Toxic metals from mill tailings and waste rock dumps throughout the Butte area have contaminated and continue to contaminate significant amounts of soil in the Butte area. Even though some disturbed areas have been regraded, topsoiled, and reseeded, potential environmental and health impacts from both historical and modern mining operations remain unresolved.

Human health concerns prompted removal actions at Walkerville and Timber Butte. Residential yards at selected properties were replaced, while waste rock dumps were remedied and reclaimed. Initial removal actions in Walkerville were completed in 1988 and Timber Butte in 1989. In addition, EPA initiated a removal in 1989 at the Travona mine shaft to divert and treat contaminated mine waters to prevent uncontrolled flow to surface and ground waters. After treatment, this water is being discharged into Silver Bow Creek.

In June 1990, EPA began a time-critical removal action on contaminated soils, which focuses on contamination "source areas" in Butte. In addition, this removal includes residential yards and areas affected by an ore concentrate spill that occurred in 1978. EPA has begun the remedial investigation and feasibility study that will address mine flooding problems in the Butte area. Further, EPA has prepared an engineering evaluation and cost analysis work plan for Lower Area One, which includes the Colorado Tailings, the Butte Reduction Works, and the manganese stock piles.

Initial work has begun on the Priority Soils expedited response action, which will focus on contamination in residential yards.

The operable units and related contamination issues are listed below. Operable units are identified in bold face at the left margin; removals are underlined.

BUTTE AREA SITE

Priority Soils

- Human health risks associated with exposure to soils contaminated with lead, cadmium, arsenic, and mercury from mining waste.

Walkerville—Removal completed in 1988

- Human health risks associated with exposure to soils contaminated with lead from mining waste.
    - Remedy: approximately 300,000 cubic yards of contaminated soils were removed.

Timber Butte—Removal completed in 1989

- Human health risks associated with exposure to soils contaminated primarily with lead and arsenic.
    - Remedy: approximately 40,000 cubic yards of contaminated soils were removed.

Other Priority Waste Sources—Removal underway in 1990, anticipated to be completed in 1991

- Human health risks associated with exposure to soils contaminated with lead and arsenic from mining waste.
    - Remedy: contaminated soils will be removed in 1990 and 1991.

Residential Soils—all identified residences not previously addressed under the other actions.

Mine Flooding (Berkeley Pit)

- Underground mine workings and Berkeley Pit flooding and generating acid mine waters.
- Potential for discharge of acid mine water to Silver Bow Creek.
- Contamination of ground water.
- Potential impacts to aquatic and terrestrial wildlife.

Travona—Removal implemented in 1989

- Flooded underground mine workings.
- Potential for discharge of mine water to Silver Bow Creek.
- Contamination of ground water and potential drinking and irrigation water sources.
- Potential impacts to aquatic life.
    - Remedy: 60,000,000 gallons of mine water treated and discharged.

Butte Non-Priority Soils

- Potential exposure of future human populations to contaminated soils in non-residential areas.

Butte Active Mine Area

- Source areas of ***fugitive dust*** contaminated with heavy metals.
- Source areas of acid mine drainage discharge to the Berkeley Pit.
- Impacts to aquatic and terrestrial wildlife resources resulting from exposure to mining waste.
- Potential exposure of future human populations to contaminated soils.

SILVER BOW CREEK (ORIGINAL) SITE

Lower Area One (including Colorado Tailings, Butte Reduction Works, and manganese stock piles)

- Surface soils and sediments, surface water, and ground water contaminated by mine and mill tailings and acid mine water discharges. High levels of heavy metal contamination.
- Contamination of potential drinking water supplies.
- Potential exposure of future human populations to contaminated soils and/or tailings.

Streamside Tailings

- Extensive deposits of mine tailings and sediments contaminated with heavy metals.
- Potential contamination of irrigation and drinking water supplies.
- Potential exposure of future human populations to contaminated soils and/or tailings.

Rocker

- Soils contaminated with arsenic and potential organic contamination as a result of past timber treating activities.
- Potential for contamination of ground water and surface water.
- Potential human health risks associated with exposure to contaminated soil and ground water.
    - Remedy: 1,021 cubic yards of arsenic-contaminated soils and wood chips were removed.

Warm Springs Ponds

- Contaminated surface water, pond bottom sediments, and ground water associated with treatment ponds that capture mining waste from upstream sources.
- Potential for release of contaminated water and sediments due to instability of pond dikes during a flood or earthquake.
- Impacts to aquatic and terrestrial wildlife.
- Potential contamination of irrigation and drinking water supplies.
- Potential exposure of future human populations to contaminated soils and/or tailings.

  Mill-Willow Bypass—Removal begun July 1990.
  - Remedy: 210,000 cubic yards of tailings and contaminated soils will be removed from the Mill-Willow Bypass and placed in the dry area of Pond 3 by November 1990. The north-south pond berms will be raised and strengthened to withstand a maximum credible earthquake and 0.5 probable maximum flood. The removal will be completed by December 1990.

MONTANA POLE SITE

The Montana Pole site is located in Butte at 202 West Greenwood Avenue. It is 40 acres in size and lies at the southwest edge of the city on the banks of Silver Bow Creek. From 1947 to 1984, the Montana Pole Treating Company used the site as the location of its wood treating operation. Montana Pole commonly used organic compounds including ***pentachlorophenol (PCP)*** and creosote in its operations. In 1983, EPA determined that wastes were seeping from the site to Silver Bow Creek at the rate of two to five gallons per day. In addition, EPA found that on-site soils and ground water had been contaminated by these wastes. These problems were addressed in a removal action initiated in 1985 while the site was still part of the Silver Bow Creek site. The Montana Pole site became a separate Superfund site in November 1986. Specific problem areas at the Montana Pole site are summarized below.

- Pole treatment activities have resulted in high levels of organic contamination in soils and ground water;
- Human health risks associated with exposure to contaminated soil, ground water, and surface water;
- Source of PCP and other organic contamination in ground water and in Silver Bow Creek; and
- Impacts to aquatic and terrestrial wildlife.

Montana Pole—Removal completed in 1987
- Remedy: 10,000 gallons of contaminated ground water were treated; 12,000 cubic yards of contaminated soils were removed.

In June 1990, MDHES began oversight of a remedial investigation and feasibility study of the Montana Pole site. This will determine the extent of contamination, the effects upon human health and the environment, and the appropriate cleanup alternatives. Contaminant studies associated with the Montana Pole site will be conducted downstream to the lower end of the Colorado Tailings. The streamside tailings remedial investigation will determine if Montana Pole contaminants have extended further downstream and if they need to be remediated. ARCO will perform the site investigations under MDHES's supervision.

ANACONDA SMELTER SITE

The Anaconda Smelter site is located in and around the city of Anaconda, about 25 miles northwest of Butte. The site consists of the original smelter, called Old Works, and Arbiter, Smelter Hill, and Anaconda and Opportunity Tailings Ponds, and many square miles of the surrounding area. The site was added to the National Priorities List in September 1983.

From 1884 to 1980, the smelter extracted metals from ore shipped from mines in the Butte area. Waste materials generated by ore processing are found throughout a 6,000-acre area. The wastes include about 185 million cubic yards of tailings, about 27 million cubic yards of ***furnace slags***, and about 300,000 cubic yards of ***flue dust***. These wastes contain elevated levels of lead, arsenic, cadmium, copper, and zinc.

The tailings typically were deposited in ponds to promote settling of solids to the bottom of the pond. These ponds (Anaconda and Opportunity) were created by a series of dikes that have left mounds of tailings as deep as 90 feet. Waste water from the ponds typically was either reused in the smelter or released into nearby water courses. Some of the problems associated with the tailings ponds include ground and surface water contamination. While the smelter was in operation, wastes also were released through stack emissions. Winds carried these emissions over a large part of the upper Deer Lodge Valley, and eventually many of the waste particles fell to the ground. These deposits, containing heavy metals and arsenic, have caused soil contamination throughout a broad area of the valley. Specific problem areas at the Anaconda Smelter site are described by the operable units below.

Mill Creek—Relocation completed in 1988

- Human health risks associated with exposure to soils contaminated by smelter emissions.
- High levels of arsenic, cadmium, and lead contamination.
    - Remedy: 37 residential relocations.

Community Soils—Soils Screening Study completed in 1988

- Potential human health risks associated with exposure to soils contaminated by smelter emissions.
- Expedited response action begun on Teressa Ann Terrace and Cedar Park homes; originally part of Old Works expedited response action, which began in December 1988.

Old Works—Removal action proposed for 1991

- Potential human health and environmental risks associated with exposure to Old Works waste pile and Streamside Wastes contaminated by smelter emissions.
- Contamination of surface water quality from runoff.
- Streamside Wastes expedited response action began in December 1988.

Smelter Hill

- Potential human health risks associated with exposure to soil, air, and ground water contaminated by smelter wastes.

Flue Dust

- Potential human health risks associated with exposure to smelter waste containing high levels of arsenic, cadmium, and lead.

Site-Wide Ground Water

- Potential for heavy metals contamination of irrigation and drinking water supplies.
- Potential contamination of Clark Fork via surface and ground water flows.

Tailings

Opportunity and Anaconda Ponds

- Tailings pond wastes containing high levels of heavy metals. Source of potential ground water and air contamination.

In 1984, ARCO began Phase 1 remedial investigation and feasibility study activities under two administrative orders on consent from EPA. Efforts to control fugitive flue dust in the community of Mill Creek were also conducted under administrative orders. Numerous Phase 1 reports were prepared, and one in particular, the health effects study, required refocusing the investigation toward the community of Mill Creek. An ***endangerment assessment*** completed by EPA during April 1986 indicated that young children in the Mill Creek community were exposed to arsenic at levels that posed unacceptable health risks. In response to this potential risk, EPA provided for temporary relocation of families with small children. Following completion of a remedial investigation and feasibility study selection of a remedy in a record of decision, EPA and MDHES reached an agreement with ARCO under which residents of Mill Creek would be permanently relocated as an interim solution to health risks posed by arsenic and other heavy metals at this location.

In September 1988, ARCO agreed to conduct additional investigations at Smelter Hill, Old Works, and Flue Dust operable units. These activities will build upon the earlier work by ARCO. In March 1990, ARCO agreed to conduct accelerated removal projects on the Arbiter and Beryllium Waste disposal sites. In addition, ARCO agreed to conduct a waste repository siting analysis on the Anaconda Smelter site.

MILLTOWN RESERVOIR SITE

The Milltown Reservoir site is located at the confluence of the Clark Fork and the Blackfoot River, adjacent to Milltown. The reservoir was created in 1907 when a dam was constructed across the Clark Fork as part of a hydroelectric power development facility. Since 1929, the Montana Power Company has owned and operated the project. Unusually high levels of arsenic, lead, zinc, cadmium, and other metals were found in the approximately six million cubic yards of sediments that have accumulated behind the dam. Contaminants in the sediments have seeped into the ground water that once served as a water supply source for Milltown. The reservoir was designated a Superfund site in September 1983.

In 1983, MDHES and EPA initiated a remedial investigation and feasibility study on the ground water. As a result, EPA provided funds for a new water supply system for Milltown which was completed in 1985. MDHES initiated additional site investigations to help determine whether releases of hazardous substances have occurred or have the potential for occurring downstream from the reservoir. ARCO continues remedial investigation and feasibility study activities at Milltown under an administrative order on consent. These studies will address the extent of contaminated reservoir sediments and ground water at Milltown and

potential downstream impacts from continued releases. ARCO is also directed to assess various cleanup alternatives. In addition, EPA, with the participation of ARCO and a local citizens' group, will be conducting a risk assessment to determine the current and potential impacts of the reservoir and sediments on public health and aquatic and terrestrial wildlife.

Specific problem areas at the Milltown Reservoir site are described briefly below.

Milltown Reservoir/Sediments

- Contaminated sediments transported by the Clark Fork have accumulated in the reservoir.
- Source of ground water contamination, which was used as a drinking water supply.
    - Remedy: record of decision for drinking water supply issued; alternate water supply completed in 1985.
- Potential source of contamination to Clark Fork below the dam during flood events.
- Impacts to aquatic and terrestrial wildlife.
- Potential exposure of human populations to contaminated soils, sediments, and/or tailings.

Clark Fork River

Geographically, the Clark Fork River operable unit begins below the Warm Springs Ponds and ends at the start of the Milltown Reservoir, a total of 120 river miles. Several major tributaries flow to the river. Tailings from Butte and Anaconda mining activities were deposited by river action along the river banks.

Releases from exposed and buried tailings, periodic releases from the Mill-Willow Bypass, and run-off from contaminated irrigated lands are the primary sources of elevated metals contaminants in the river system. Recent studies show that metals have entered the aquatic food chain, which may have long-term effects on the fish population. In addition, occasional major storms have deposited large amounts of contaminants in the river, resulting in massive fish kills. The Clark Fork transported contaminated sediments to the Milltown Reservoir and may continue to add to downstream impacts. Specific problem areas at the Clark Fork River operable unit are described briefly below.

- Floodplain sediments contaminated by mining wastes.
- Potential contamination of surface and ground water irrigation and drinking water supplies.
- Aquatic and terrestrial wildlife impacts due to exposure to contaminated sediments and surface water.
- Potential exposure of future human populations to contaminated soils and/or tailings.

MDHES initiated a screening study in 1987 to assess the potential use of remote sensing techniques to identify locations of exposed and buried tailings. The study also addressed current and/or potential ground water contamination and impacts on agricultural lands from irrigation with contaminated water. The screening study will be completed by January 1991. Meanwhile, EPA will hold meetings with potentially responsible parties, affected land owners, local governments, public interest groups, and citizens to assist in planning a remedial investigation and feasibility study work plan for work that may begin in 1991.

GLOSSARY

action level: An amount of a contaminant in soil, air, or water at which EPA believes a remedy is necessary. Action levels vary from site to site and even within sites, based on potential exposures.

action memorandum: This is a document prepared by EPA that records and provides the rationale for the selection of a removal action.

administrative order on consent: A legal and enforceable agreement signed between EPA and the potentially responsible parties, whereby they agree to perform a remedial investigation and feasibility study or a removal action (see definitions below). The agreement describes actions to be taken at a site and may be subject to a public comment period. Unlike a judicial consent decree, an administrative order on consent does not have to be approved by a judge.

administrative record: A collection of documents from which EPA makes a cleanup decision about a Superfund site.

applicable or relevant and appropriate requirements (ARARs): A comprehensive set of laws and regulations that guide the selection and performance of a cleanup activity at a particular site. An example is the federal Clean Air Act.

consent decree: A legal and enforceable agreement signed by the United States and the potentially responsible parties and entered as a court order by a judge. The decree describes activities to be conducted during remedial design and remedial action at a site.

containment: A technology, such as a clay cap, to eliminate or reduce an environmental hazard by preventing it from being mobilized into the environment. Containment does not generally result in a reduction of toxicity or volume.

creosote: An organic compound used as a wood preservative. It is often used on railroad ties, telephone and power poles. It is a skin irritant and often contains known or suspected carcinogens and other harmful substances.

detailed analysis of alternatives: The detailed analysis of alternatives is a thorough evaluation and presentation of the relevant information needed to allow decision-makers to select a site remedy. Alternatives are evaluated against nine evaluation criteria (see page 5 for the nine criteria). The alternatives are analyzed individually against each criterion and then compared against one another to determine their respective strengths and weaknesses and to identify the key trade-offs that must be balanced for that site. The results of the detailed analysis are summarized and presented to the decision-makers so that an appropriate preferred alternative can be identified.

development and screening of alternatives: The primary purpose of this phase of the feasibility study is to develop an appropriate range of waste management options that will be analyzed more fully in the detailed analysis phase of the feasibility study. Activities may include identifying potential treatment technologies; containment or disposal requirements for residuals or untreated waste; screening technologies; assembling technologies into alternatives; screening alternatives, as necessary, to reduce the number subject to detailed analysis; preserving an appropriate range of options; and identifying action-specific areas.

downgradient: When used in reference to ground water, the term "downgradient" carries the same meaning that 'downstream' does with respect to rivers and streams.

ecological risk assessment: A study that evaluates the potential threat that contaminant releases have on a given environment.

endangerment assessment: A study conducted to calculate the nature and extent of contamination at a site on the National Priorities List and the risks posed to public health or the environment. An endangerment assessment supplements a remedial investigation. Now called "risk assessment."

engineering controls: Physical or technical devices, such as ground water treatment systems, that may be necessary to assure the effectiveness of a remedial alternative.

engineering evaluation and cost analysis (EE/CA): A study conducted during an expedited response action to develop and design effective solutions to a particular problem at a site and to estimate costs of each solution as one basis for selecting an appropriate response action. Engineering evaluations and cost analyses must comply with all applicable or relevant and appropriate requirements. After a public comment period and a response to public comment, the final selection of a response action is documented in an action memorandum.

expedited response action (ERA): One of three levels of removal cleanup activity that may be undertaken at a Superfund site. The study associated with an expedited response action proceeds more quickly than a remedial investigation and feasibility study, but not as quickly as most "removal actions." An expedited response action is sometimes referred to as a "non-time critical removal action." Expedited response actions are completed on an accelerated schedule and generally deal with well-defined contamination problems that present a significant, although not immediate threat, to human health and the environment.

flue dust: Material that results from combustion and emerges from a chimney or stack.

fugitive dust: Airborne dust from waste piles that cannot be pinpointed to a single source.

furnace slags: Solid by-products of the operation of a combustion chamber such as a smelter furnace.

ground water: The supply of fresh water found beneath the earth's surface (usually in aquifers) which is often used for supplying wells and springs.

heavy metals: A group of chemical elements characterized by their ability to conduct electricity and heat. Examples of heavy metals include copper, cadmium, lead, and zinc. Exposure to some metals (such as lead, mercury, and cadmium) can have a toxic effect on the body. Metals such as copper and zinc have adverse impacts on fish and other aquatic communities.

implementation: This step involves the actual initiation of activities set out in a removal action work plan and finalized in the action memorandum.

institutional controls: Rules, regulations, laws, or covenants that are not engineering or treatment controls. They are used to supplement active cleanup measures. An example is zoning restrictions.

levee: A structure used to contain a stream or to prevent spillage into a given area.

national priorities list (NPL): EPA's list of hazardous waste sites identified for possible remediation using Federal Superfund money. EPA is required to update this list at least once a year.

negotiations: Legal discussions between MDHES, EPA, and the potentially responsible parties; these are not open to the public.

non-time-critical response: Response before a remedial investigation and feasibility study is completed but after an engineering evaluation and cost analysis to guide removal efforts is prepared. This is also referred to as an expedited response action.

100-year flood: A major flood event that has a one percent chance of happening in a given year or on the average occurs only once every 100 years.

operable unit (OU): A geographic or contaminant-specific portion of the larger Superfund site. For example, EPA has identified management of contamination in the Mill Creek community at the Anaconda Smelter site as an operable unit of that site. During the course of remediation, a site may be divided into a number of operable units.

operation and maintenance: Operation and maintenance activities are: 1) on-going activities conducted at a site to ensure that a Superfund action is effective and operating properly; and 2) actions taken after construction to assure that treatment facilities constructed will be properly operated, maintained, and managed to maintain efficient cleanup and prescribed limitations in an optimum manner.

organic compounds: Chemicals containing mainly carbon, hydrogen, and oxygen. For example, petroleum products, solvents, and pesticides are organic compounds. Exposure to some organic compounds can produce a toxic effect on body tissues and processes.

pathway: A route by which a contaminant may impact humans or the environment; for example, drinking water can be a pathway for mining contaminants.

pentachlorophenol (PCP or "Penta"): A toxic organic compound used as a wood preservative. Penta is a known carcinogen and is often found in creosote.

plume: A zone or area of contaminated ground water, so named because its shape is similar to a feather or plume.

potentially responsible party (PRP): An individual, company, or government body identified as potentially liable for cleanup of hazardous substances at a site. Under the Superfund program, EPA may hold liable any party that has generated or transported hazardous substances, as well as those who owned or operated a disposal facility, or those who currently own such facilities.

preplanning: Remedial investigation and feasibility study preplanning is the initial phase that sets the groundwork for all remedial or removal activities. This step precedes scoping and includes planning of scoping activities. Typical preplanning activities may include preparing a draft cost analysis application (done by the state if it has the lead), preparing a site management plan, preparing statements of work for and conducting a supplemental PRP search, preparing a unilateral administrative order, and preparing a draft enforcement strategy.

proposed plan: A brief summary of all alternatives EPA or MDHES evaluated during the feasibility study and EPA's preferred alternative. A proposed plan is published when a feasibility study has been completed.

record of decision (ROD): The document prepared by EPA that formally records the selection of a remedy for a site or operable unit. A record of decision is issued in conjunction with a remedial investigation and feasibility study.

remedial action: This is the actual construction or implementation phase of a Superfund site cleanup that follows remedial design.

remedial alternative: One of several possible technologies or solutions being considered as a remedy for a human health or environmental problem.

remedial design: This phase of remedial action follows the record of decision and devises methods for executing the selected remedy. During the remedial design phase, technical staff develop engineering drawings and specifications for final site cleanup.

remedial investigation and feasibility study (RI/FS): Two different but related studies which are conducted in close coordination at a Superfund site. They are intended to:

- Gather the information necessary to identify the types, locations, and amounts of contamination at a Superfund site;
- Establish criteria for conducting remedial action at the site;
- Identify and screen alternatives for remedial action; and
- Analyze in detail the technology and evaluate the alternatives.

RI/FS scoping: Scoping is the initial planning phase of site remediation and is begun as part of the funding allocation and planning process. The objective of scoping is to determine what types of actions may be required to address site problems, identifying whether interim actions are necessary or appropriate to mitigate potential threats, preventing further environmental degradation or rapidly reducing risks significantly, and identifying the optimal sequence of site actions and investigative activities. Specific project plans are developed beginning with the collection of existing site data. This is used to identify preliminary boundaries of the study area, identify likely remedial action objectives, and establishing whether the site may best be remedied as one or several separate operable units.

removal action: An action taken over the short-term to address a release or threatened release of hazardous substances. For example, the removal of contaminated soils in Walkerville was a removal action.

response action: Cleanup action at a Superfund site, including remedial and removal actions.

risk assessment: An investigation conducted as part of a remedial investigation that defines the risks posed to public health and/or the environment at a Superfund site. This type of study used to be referred to as an "endangerment assessment."

scoping: The aim of scoping is to focus removal and remedial activities.

screening study: A preliminary Superfund study that provides analytical data for the purpose of prioritizing the remedial investigation and feasibility study and removal activities at a Superfund site.

selection of remedy: This final step, which results in the "preferred alternative," is the preliminary decision on site remediation that EPA releases to the public for comment. The preferred alternative is presented in the propcsed plan. After the public comment period, a responsiveness summary is prepared to address public comments, and EPA's final decision is documented in the record of decision.

site characterization: This is the process of collecting information about and describing a site. Remedial investigation and feasibility study site characterization activities may involve conducting field investigations; defining the nature and extent of contamination (waste types, concentrations, distributions); identifying federal and state chemical and location-specific applicable or relevant and appropriate requirements; and developing baseline risk assessment to identify the existing or potential risks that may be posed to human health and the environment by the site.

supplemental site characterization: This step is Phase II of a remedial investigation. Based on the results of the initial site characterization, the technical staff may determine the need to study specific areas in greater detail, or may determine that additional data are needed to understand the environmental problems at the site being addressed in the feasibility study. New data are then collected, validated, and analyzed to fill in the informational gaps of the initial site characterization.

tailings: Residue of raw materials or waste separated out during the milling of mineral ores.

time-critical response: Response within a reasonably short time period from discovery of a threat.

time-critical removal action: This is one of three types of removal actions: emergency response, time-critical removal action, and expedited response action. A time-critical removal is of lower priority than an emergency response but occurs more quickly than an expedited response action. Time-critical removals are usually completed within about six months.

toxicity: A relative measure of a substance's ability to damage living tissue or impair normal biological functions.

treatability study: A treatability study is a small-scale test of a technology. Treatability studies may be necessary to evaluate a particular technology for use on site-specific wastes in the event that existing site or treatment data are insufficient to evaluate alternatives adequately. Treatability studies provide information to assess the feasibility of a technology. Additional activities involve preparing sampling analysis plans and treatability study work plans, conducting lab analysis and data validation, and preparing a treatability study summary report.

unilateral order: A legal document issued by EPA that requires a responsible individual, business, or another entity to conduct work or take corrective action. This document if not agreed to or signed by the responsible business or individual and EPA can step in and take over the work, charging the party with up to three times the cost of the work.

work plan: Work plans are detailed guidelines for conducting Superfund activities. They also assign responsibilities and project a project's schedule and cost.

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